UNIV.OF
TORONTO
LIBRARY

International Congress on Tuberculosis, 6th, Washington, 1908
P
Med
I

Transactions

of the

Sixth International Congress on Tuberculosis.

WASHINGTON, SEPTEMBER 28 TO OCTOBER 5, 1908.

WITH AN ACCOUNT AND CATALOGUE OF THE TUBERCULOSIS EXHIBITION,

WASHINGTON, SEPTEMBER 21 TO OCTOBER 12, 1908.

In Six Volumes.

VOLUME FOUR, PART ONE.

PROCEEDINGS OF SECTION VI,

State and Municipal Control of Tuberculosis.

413016
14.6.93

Philadelphia:
WILLIAM F. FELL COMPANY
1908.

RC
307
A4 I5
1908
v. 4
pt. 1-2

EDITED BY THE SECRETARY-GENERAL.

COMMITTEE ON PRINTING AND PUBLICATION

Dr. LIVINGSTON FARRAND, Chairman.
Mr. HOMER FOLKS.
Dr. H. R. M. LANDIS.
Dr. JOHN H. LOWMAN.
Dr. MARSHALL L. PRICE.
Dr. JOSEPH WALSH.

EDITORIAL COMMITTEE.

The Presidents of the Sections.
Dr. WM. H. WELCH.
Dr. VINCENT Y. BOWDITCH.
Dr. CHARLES H. MAYO.
Dr. ABRAHAM JACOBI.
Mr. EDWARD T. DEVINE.
Surgeon-General WALTER WYMAN.
Dr. LEONARD PEARSON.

EXECUTIVE COMMITTEE.

Dr. LAWRENCE F. FLICK.
Dr. LIVINGSTON FARRAND.
Dr. JOSEPH WALSH.
Dr. JOHN S. FULTON.

Officers of Section VI.

President:

Surgeon-General WALTER WYMAN.

Honorary Presidents:

Gov. CONRAD CEDERCRANTZ, Sweden,
Dr. KARL HAMEL, Germany,
Dr. STABSARZT HELM, Germany,
Dr. J. L. JACOBSEN, Cuba,
Dr. W. KÜRSTEINER, Switzerland,
Dr. EDUARDO LICEAGA, Mexico,
Dr. F. MONTIZAMBERT, Canada,
Dr. ARTHUR NEWSHOLME, England,
Dr. HOLGER ROERDAM, Denmark.

Vice-Presidents:

Dr. A. C. ABBOTT,
Dr. HERMANN M. BIGGS,
Dr. H. M. BRACKEN,
Dr. C. V. CHAPIN,
Dr. W. M. L. COPLIN,
Dr. THOS. DARLINGTON,
Dr. S. G. DIXON,
Dr. SAMUEL H. DURGIN,
Dr. WM. A. EVANS,
Dr. N. K. FOSTER,
Dr. G. W. GOLER,
Dr. W. C. GORGAS,
Dr. MARCUS HAASE,
Dr. T. J. HAPPEL,
Dr. C. A. HARPER,
Dr. CHARLES HARRINGTON,*
Dr. H. F. HARRIS,
Dr. ELMER E. HEG,
Dr. JOHN N. HURTY,
Dr. C. H. IRION,
Dr. GEO. M. KOBER,
Dr. QUITMAN KOHNKE,
Dr. RICHARD H. LEWIS,
Dr. LAWRENCE LITCHFIELD,
Dr. J. N. MCCORMACK,
Dr. HENRY MITCHELL,
Dr. JOSEPH NEFF,
Dr. HERBERT D. PEASE,
Dr. EUGENE H. PORTER,
Dr. MARSHALL L. PRICE,
Dr. C. O. PROBST,
Dr. CHAS. D. SMITH,
Dr. G. T. SWARTS,
Dr. THOS. D. TUTTLE,
Dr. H. P. WALCOTT,
Dr. HENRY B. WARD,
Dr. G. W. WEBSTER,
Dr. C. L. WILBUR,
Dr. W. C. WOODWARD.

Secretary:

Dr. J. W. KERR.

* Deceased.

Contents of Volume IV, Section VI.

PAGE

"Ueber die staatliche und private Fürsorge gegen die Tuberkulose in Oesterreich" ("Governmental and Private Measures against Tuberculosis in Austria").... 1
DR. HERMANN VON SCHRÖTTER.

Measures against Human Tuberculosis in Denmark..... 3
DR. HOLGER RÖRDAM.

La lutte contre la tuberculose en Grèce..... 28
DR. B. PATRIKIOS.

The Task of the State in the Antituberculosis Movement..... 36
HON. GOVERNOR CONRAD CEDERCRANTZ.

Statistik der Volkssanatorien für Erwachsene in der Schweiz und gegenwärtiger Stand der Tuberkulosebekämpfung in der Schweiz..... 40
DR. W. KÜRSTEINER.

The Campaign against Tuberculosis in the Argentine Republic..... 49
DR. EMILIO R. CONI.

La tuberculosis pulmonar en las Cuidades de Guayaquil y Quito..... 62
DR. CARLO D. SAENZ.

The First Six Years' Work of the Uruguayan League against Tuberculosis..... 83
DR. JOAQUIN SALTERAIN.

The Fight against Tuberculosis in Portugal..... 94
DOM ANTONIO MARIA DE LANCASTRE.

The Problem of Tuberculosis in Cuba..... 113
DR. J. L. JACOBSEN.

The Tuberculosis Problem in the Philippines and the Elimination of Intestinal Parasites as the First Step in its Solution..... 127
DR. VICTOR G. HEISER.

Tuberkulose-Gesetzgebung in der Schweiz..... 132
DR. MAX BOLLAG.

The Present Status of Antituberculosis Work in Canada..... 135
DR. J. H. ELLIOTT.

La lutte contre la tuberculose en Hongrie..... 154
DR. C. CHYZER.

Die getroffenen und noch erwunschten amtlichen Massregeln gegen die Tuberkulose in der königl. Freistadt Kolozsvar (Ostungarn)..... 162
DR. JOHANNES BARTHA.

Conclusions sobre la profilaxia de las Tisis..... 169
DR. CAMILO CALLEJA.

The Decline of Phthisis and of other Forms of Tuberculosis in Liverpool..... 173
DR. E. W. HOPE.

PAGE

Die Tätigkeit der Internationalen Vereinigung gegen die Tuberkulose 182
DR. F. HELM.

The Duties of the Government in the Restriction of Tuberculosis 189
DR. VICTOR C. VAUGHAN.

The Administrative Control of Tuberculosis in New York City 198
DR. HERMANN M. BIGGS.

Die Anzeigepflicht bei menschlicher Tuberkulose 203
DR. HAMEL.

The Statutory Control of Tuberculosis, with Special Reference to the Maryland System 200
DR. MARSHALL L. PRICE.

Geheimrat Putter's Information Bureaus and Dispensaries 226
DR. HERMANN M. BIGGS.

The Government Control of Tuberculous Patients in Pennsylvania 232
DR. SAMUEL G. DIXON.

Some Economic Aspects of the Free Treatment of Tuberculosis by the State 242
MR. ROWLAND G. HAZARD.

Some of the Newer Phases of Construction and Management of State Sanatoriums as Exemplified by the Ohio Institution 246
DR. C. O. PROBST.

The Function of Municipal Governments in Licensing Private Sanatoriums for Tuberculosis 253
DR. H. C. CLAPP.

An Aspect of the Evolution of the State in its Relationship to Tuberculosis 264
DR. F. G. BUSHNELL.

Federal Health Organization 271
PROF. IRVING FISHER.

Zur Bekämpfung der Tuberkulose in den Gemeinden 274
DR. BENÖ FARKAS.

A Great National Problem 278
DR. C. A. L. REED.

Vorschlag zur Ausrottung der Tuberkulose 287
DR. EMERICH TOTH.

Coöperation between the State and Private Corporations in the Crusade against Tuberculosis as Exemplified at the White Haven Sanatorium 290
DR. WILLIAM B. STANTON.

Russian Laws on Tuberculosis 306
DR. SIMON TH. VON UNTERBERGER.

Medical Factory Inspection 307
DR. G. M. PRICE.

Sanitary Measures in the Home in Relation to Tuberculosis 313
DR. W. A. EVANS.

Town Planning in Relation to the Antituberculosis Campaign 319
MR. BENJAMIN C. MARSH.

A Suggested Law to Regulate House Ventilation for the Prevention of Tuberculosis 323
DR. CHARLES DENISON

PAGE

The Present Status of Railway Sanitation in the United States 333
MR. H. M. BRACKEN.

Collection of Statistics of Tuberculosis 358
DR. CRESSY L. WILBUR.

Consumption and Vital Statistics 371
DR. CHAS. A. HODGETTS.

Statistical Data Relative to Tuberculosis in Mexico 376
DR. EDUARDO LICEAGA.

The Need of Family Histories for the Study of Tuberculosis 381
DR. CHARLES V. CHAPIN.

Official Information Necessary to Social Control of Tuberculosis 387
MESSRS. W. H. ALLEN AND RUFUS E. MILES.

At what Age Periods and in what Measure has the Reduction in the Mortality Rate from Tuberculosis Manifested itself in the City of New York during the past Forty Years? 391
DR. W. H. GUILFOY.

Die Bekämpfung der Tuberkulose in der deutschen Armee 402
DR. SAAR.

Die Tuberkulose und ihre Bekämpfung in der kaiserlich-deutschen Marine und in den deutschen Schutzgebieten 411
DR. KIRSCH.

Le Speculation du sol des villes et la contagion tuberculeuse. Comment peuvent agir les villes 423
M. AUGUSTIN REY.

Fighting the Scourge among the Indians 428
MR. FRANCIS E. LEUPP.

The United States Marine Hospital Sanatorium for Tuberculosis at Fort Stanton, New Mexico 437
DR. P. M. CARRINGTON.

The Prevention of Consumption among Italian Immigrants 454
DR. A. CACCINI.

Tuberculosis in the Philippines 465
PROF. FERNANDO CALDERON.

What States, Counties, and Municipalities may do toward the Eradication of Tuberculosis 476
DR. W. H. SANDERS.

La loi et l'initiative privée contre la tuberculose 482
DR. BOUREILLE.

The Prevention of Tuberculosis 490
DR. J. L. MEDINA.

Plan General de Casas Sanitarias y Hogar Amueblado Para ó Clase Trabajadora de los Tropicos, en Interés de la Cruzada contra la Tuberculosis 496
JOSÉ F. TORAYA.

Contents of Volume IV, Section VII.

PAGE

The Economic Importance of Tuberculosis of Food-producing Animals 501
DR. A. D. MELVIN.

Economics as a Positive Factor in the Dissemination of Tuberculosis in Animals... 512
DR. O. E. DYSON.

A Study of the Tuberculous Contamination of the New York City Milk-supply 523
DR. ALFRED F. HESS.

Bovine Tuberculosis in Louisiana and some other Southern States..... 533
PROF. W. H. DALRYMPLE.

Dissemination of Tuberculosis among Animals in Alabama..... 544
DR. C. A. CARY.

Control of Tuberculosis in Domestic Animals in Pennsylvania..... 547
DR. LOUIS A. KLEIN.

Bovine Tuberculosis under Range Conditions..... 557
DR. M. E. KNOWLES.

Tuberculosis in Range Cattle in California..... 561
DR. GEORGE S. BAKER.

The Prevalence of Tuberculosis among Dairy Cattle in the Vicinity of San Francisco, California..... 564
DRS. A. R. WARD AND C. M. HARING.

Tuberculosis of Cattle from the Point of View of the Farmer..... 571
PROF. JESSE E. POPE.

Tuberculosis in Wild Animals in Captivity..... 584
DR. W. REID BLAIR.

Observations upon Monkeys of the Philadelphia Zoölogical Garden after Injection of Koch's Old Tuberculin..... 591
DRS. C. Y. WHITE AND HERBERT FOX.

The Occurrence and Significance of Tubercle Bacilli in the Feces of Tuberculous Cattle..... 599
DR. E. C. SCHROEDER.

Porcine Tuberculosis..... 612
DRS. S. STEWART AND A. T. KINGSLEY.

Review of Recent Investigations on Tuberculosis Conducted by the United States Bureau of Animal Industry..... 620
DRS. J. R. MOHLER AND H. J. WASHBURN.

The Relation of Human and Bovine Tuberculosis..... 645
PROF. ROBERT KOCH.

The Relation between Human and Animal Tuberculosis..... 651
DR. THEOBALD SMITH.

PAGE

The Relations of Human and Bovine Tuberculosis 661
PROF. G. SIMS WOODHEAD.

Sur les rapports de la tuberculose bovine et de la tuberculose humaine 666
DR. S. ARLOING.

Investigations of the Relations of Human and Bovine Tuberculosis and the Tubercle Bacilli 672
PROF. J. FIBIGER AND C. O. JENSEN.

Relations of Human and Bovine Tuberculosis 682
DR. M. P. RAVENEL.

The Susceptibility of Cattle to the Virus of Surgical Forms of Human Tuberculosis 686
DR. R. R. DINWIDDIE.

Tuberculous Cervical Adenitis 692
DR. PAUL A. LEWIS.

The Types of Tubercle Bacilli Present in Eighty-four Cases of Human Tuberculosis in New York City 697
DR. WM. H. PARK.

Studies in Atypical Forms of Tubercle Bacilli Isolated Directly from the Human Tissues in Cases of Primary Cervical Adenitis 704
DR. CHARLES W. DUVAL.

La Tuberculosis Bovina en Cuba 730
DRS. J. N. DAVALOS Y J. T. CARTAYA.

The Intertransmissibility of Tuberculosis 735
DR. CHARLES F. DAWSON.

The Conference on the Relation of Tuberculosis of Animals and of Man 741–756

The Infection of Swine from Tuberculous Cattle 757
DR. A. W. BITTING.

Tuberculous Hogs an Indication of Tuberculous Cattle 759
DR. A. T. PETERS.

The Tuberculin Test an Efficient Agent for the Detection of Bovine Tuberculosis .. 765
DR. GEORGE B. JOBSON.

A Report of the Results of the Continued Injections of Tuberculin upon Tubercular Cattle 773
DR. S. B. NELSON.

Rapport de commission de l'ophtalmo-réaction 785
DR. BAILLIART.

Ophthalmo-tuberculin Test in Cattle 804
DR. D. S. WHITE AND EUGENE MCCAMPBELL.

Sur un nouveau mode de produire chez l'homme tuberculeux la réaction de la peau a l'aide de la tuberculine 814
PROF. T. LIGNIÈRES.

Sur l'intra-dermo-réaction à la tuberculine chez les animaux 821
PROF. G. MOUSSU ET DR. CH. MANTOUX.

Ear-tagging Marketed Live Stock 837
DR. BURTON ROGERS.

Measures against Animal Tuberculosis in Denmark 850
DR. BERNHARD BANG.

PAGE

The Control of Bovine Tuberculosis 869
DR. J. G. RUTHERFORD.

History of the Agitation against Bovine Tuberculosis in Massachusetts 884
DR. AUSTIN PETERS.

The Use of Tuberculin in Controlling Tuberculosis in Herds 903
DR. C. J. MARSHALL.

Bovine Tuberculosis in Maine for Twenty Years 909
MR. JOHN M. DEERING.

The Value of Tuberculin in the Control of Tuberculous Herds 918
PROF. VERANUS A. MOORE.

The Problem of Bovine Tuberculosis Control 927
DR. M. H. REYNOLDS.

Precautionary Sanitary Legislation against Tuberculosis of the Domesticated Animals in the United States 952
DR. D. ARTHUR HUGHES.

Survie économique des bovidés ayant réagi à la tuberculine 984
J. B. PIOT (BEY).

Meat and Dairy Herd Inspection as Preventive Measures against the Spread of Tuberculosis among Cattle 987
DR. OTTO G. NOACK.

Vaccination gegen Tuberkulose beim Rinde 997
PROF. J. F. HEYMANS.

The Vaccination of Cattle against Tuberculosis 1002
DR. LEONARD PEARSON.

SECTION VI.

State and Municipal Control of Tuberculosis.

FIRST SESSION.

Monday afternoon, September 28, 1908, in the New National Museum.

THE STATUS OF THE TUBERCULOSIS CAMPAIGN IN VARIOUS COUNTRIES.

The President of the Section, Surgeon-General Walter Wyman, called the Section to order at half past two o'clock. General Wyman expressed his pleasure, shared by the members of the Central Committee, in greeting the foreign representatives who have given such worthy aid to the advancement of State and municipal control of tuberculosis. He extended a greeting to American representatives, and thanked them all for the interest they have shown, and for their contributions toward the success of the Section.

He nominated the following honorary presidents of the Section:

Governor Conrad Cedercrantz, Stockholm, Sweden.
Dr. Eduardo Liceaga, Mexico, Mexico.
Dr. F. Montizambert, Ottawa, Canada.
Dr. Arthur Newsholme, London, England.
Regierungsrat Dr. Hamel, Berlin, Germany.
Stabsarzt Dr. Helm, Berlin, Germany.
Dr. W. Kürsteiner, Bern, Switzerland.
Dr. J. L. Jacobsen, Havana, Cuba.
Dr. Holger Rördam, Copenhagen, Denmark.

These were unanimously elected honorary presidents of the Section.

The first paper on the program was that of Dr. Hermann von Schrötter, of Vienna, Austria, entitled "*Ueber der stättliche und private Fürsorge gegen die Tuberkulose in Oesterreich*" ("*Governmental and Private Measures Against Tuberculosis in Austria*").

Dr. von Schrötter excused himself from reading his paper, saying that he had read it in Philadelphia at the Conference, where many of those now present had heard it. Dr. von Schrötter also deposited a printed account of the Austrian movement against tuberculosis under the title "*Vorschriften der K. K. Oesterreichischen Behörden zur Bekämpfung der Tuberkulose.*"

Continuing, Dr. von Schrötter said: "It cannot be emphasized enough—and herewith I am touching the care of the State—that the attempts of all the mentioned private institutions and associations in every way enjoy the most careful aid of the Austrian Government. By a law of December 28, 1906, the amount of two million kronen (equal to more than $400,000 in American standard) has been invested by the government for the crusade against tuberculosis. This fund is to be managed by a board of trustees, to which belong representatives of the Ministry of Home Office, the Financial Department, the Department of Public Instruction, the Chief of the Board of Health, and the private tuberculosis associations. This 'Curatorium,' at its meeting of February 29, 1908, decided to distribute large amounts to the most important societies, as the 'Verein Heilanstalt Alland' and the 'Verein Viribus Unitis.' In the same way it was endeavored to secure some amounts for the aid of institutions to be founded later. If the present amount of $400,000 appears small in comparison with the most expensive requirements of a successful combat against tuberculosis, the Austrian Parliament, in granting this mentioned credit, has entered a path which, as I believe, has not yet been followed by any other country. It might be expected that an official undertaking like this would be an example for other countries. At the meeting of yesterday we learned, from the interesting communication of Governor Stuart, that the State of Pennsylvania has already decided to give $2,000,000 for this most important purpose."

MEASURES AGAINST HUMAN TUBERCULOSIS IN DENMARK.

By Holger Rördam,

Navy Surgeon, Member of the Danish Parliament, Chairman of the Executive Committee of the National Association for the Combating of Tuberculosis, Delegate of the Danish Government.

Denmark is not among the countries that suffer most from the scourge of tuberculosis.

During the last five years the average pulmonary tuberculosis death-rate was annually 1.5 per 1000; the death-rate for all forms of tubercular diseases about 2 per 1000 annually. Owing to the increasing prosperity of the population as well as to the spread of knowledge and to sanitary improvements, tuberculosis has been steadily decreasing during the last decade, which fact will be fully borne out by the following statistics of the tuberculosis death-rate in Copenhagen.

DEATH-RATE FROM CONSUMPTION AND OTHER FORMS OF TUBERCULAR DISEASES IN COPENHAGEN 1876–1906.

Year.	Number of Inhabitants.	Consumption.		All Forms of Tubercular Diseases.	
		Number of Deaths.	Per Cent.	Number of Deaths.	Per Cent.
1876	216,000	653	3.02	771	3.57
1877	222,000	686	3.09	821	3.70
1878	226,000	637	2.82	780	3.45
1879	232,000	727	3.13	902	3.89
1880	240,000	760	3.17	945	3.94
1881	250,000	704	2.82	883	3.57
1882	255,000	765	3.00	1001	3.93
1883	263,000	699	2.66	897	3.41
1884	274,000	750	2.74	1006	3.67
1885	284,000	705	2.48	949	3.34
1886	289,000	653	2.26	930	3.22
1887	295,000	754	2.56	954	3.23
1888	303,500	808	2.66	1018	3.56
1889	308,600	766	2.48	1026	3.32
1890	314,600	735	2.34	1005	3.19
1891	319,000	680	2.13	968	3.03
1892	323,000	634	1.96	939	2.90
1893	327,000	610	1.87	895	2.74

DEATH-RATE FROM CONSUMPTION AND OTHER FORMS OF TUBERCULAR DISEASES IN COPENHAGEN 1876–1906.—(*Continued.*)

YEAR.	NUMBER OF INHABITANTS.	CONSUMPTION.		ALL FORMS OF TUBERCULAR DISEASE.	
		Number of Deaths.	Per Cent.	Number of Deaths	Per Cent.
1894	331,300	660	1.99	910	2.75
1895	335,700	661	1.97	984	2.93
1896	340,500	648	1.90	904	2.65
1897	345,000	625	1.81	870	2.52
1898	349,000	611	1.75	851	2.44
1899	354,000	603	1.71	803	2.27
1900	358,000	657	1.84	877	2.45
1901	381,000	585	1.52	825	2.14
1902	411,000	489	1.19	706	1.72
1903	417,000	588	1.41	820	1.96
1904	423,000	632	1.49	855	2.02
1905	425,000	671	1.58	907	2.13
1906	432,000	660	1.53	842	1.95

As will be seen from the following tabular and graphic statement, a relatively happy condition of things may be said to exist in Copenhagen in comparison with other large cities of Europe, especially western and northern Europe.

DEATHS FROM TUBERCULOSIS PULMONUM PER 100,000 INHABITANTS.

YEAR.	PARIS.	VIENNA.	MUNICH.	CHRISTIANIA.	STOCKHOLM.	BERLIN.	LONDON.	COPENHAGEN.	AMSTERDAM.	ROTTERDAM.
1899	572	379	299	281	261	219	187	171	168	159
1900	379	379	325	276	245	233	175	183	184	167
1901	402	353	274	232	247	219	170	154	152	149
1902	396	344	273	204	231	204	164	119	143	136
1903	382	334	255	212	215	193	160	141	138	130
1904	382	314	258	219	222	208	167	149	143	122
1905	380	329	286	278	222	214	147	158	146	133
Average number	413	347	281	243	235	213	167	153	153	142

This happy state of things in Copenhagen and Denmark with regard to the tuberculosis mortality is not due to special measures taken in Denmark to combat tuberculosis, but may be said to be due, on the whole, to the standard of culture attained by this country. It was only recently that Denmark began to participate directly in the fight against tuberculosis; to make up for this, however, great efforts have been made of late on the part of the gov-

ernment as well as by municipal bodies and private persons, so that Denmark is no doubt the country most advanced in combating tuberculosis and the one where the greatest sacrifices are being made in fighting this disease.

Private Measures for the Combating of Tuberculosis.

For several years Danish medical men have been making strenuous efforts to combat tuberculosis; the only results of these efforts for a number of years, however, being one seaside hospital for scrofulous children, the Refsnaes Seaside Hospital. In the year 1898 the Danish Medical Association obtained a Government grant, which enabled them to publish a short pamphlet on tuberculosis, 200,000 copies of which were distributed free, and to have a "tuberculosis placard" hung up in all public and many private buildings in Denmark; and in 1900 the first Danish consumption sanatorium, Vejlefjord Sanatorium, to which Danish medical men had contributed very largely, was opened, thanks to the energy of the present medical superintendent of the institution, Professor Saugman.

At the initiative of Professor Carl Lorentzen and Mr. Holger Rördam, Navy Surgeon and Member of the Lower House of the Danish Parliament, a Danish National Association for the Combating of Tuberculosis was founded on the 16th of January, 1901, an association which has been most successful in its endeavors. It has about 30,000 members, contributing about 100,000 kroner (about $25,000) in yearly subscriptions, besides which it has received several large contributions, gifts, and bequests. Great efforts for combating tuberculosis have, moreover, been made by the National Association by the publishing of instructive pamphlets, by instructive lectures, —lately special lectures for school children,—and especially by the erection of sanatoriums for the necessitous.

At present the National Association maintains five consumption sanatoriums for the necessitous, with accommodation for about 500 patients, besides having contributed toward the erection of other sanatoriums in out-of-the-way islands, such as Bornholm and the Faroe Islands.

The total expenses of all the National Association's sanatoriums amount to 1,750,000 kroner.

Finally, the National Association maintains a tuberculosis station (dispensary) in Copenhagen.

The Danish Coöperative Sanatorium Society was founded in 1904 with the object of building and maintaining one or several sanatoriums, where members suffering from consumption might be treated and nursed as cheaply as possible. The subscription per member is 3 kroner once for all, and may be paid at once or in 28 yearly instalments. The society has built two sanatoriums with accommodation for 250 patients in all, the expenses amounting to about 900,000 kroner.

The Danish Children's Homes Society was founded in 1902 with the object of building and maintaining homes for tuberculous children. At present the society has two children's homes, one for boys and one for girls.

The society "Boserups Minde" was founded in 1903 with the object of supporting necessitous members, especially persons living in Copenhagen, who, through suffering from pulmonary tuberculosis, have sustained economic loss, of providing them with suitable food at moderate prices, and of sending them into the country. The society has a fund for starting and maintaining country colonies.

The society Copenhagen and Environs Children's Sanatoriums was founded in 1889 with the object of providing gratis treatment for poor, ailing, especially scrofulous, children. The society has built a sanatorium.

In addition, there are other societies, which, by their efforts, contribute indirectly toward combating this disease, even if they were not founded with that immediate object. The Hygienic Society was founded in 1879 with the object of contributing to the solution of such hygienic problems as are of special importance to Denmark. The Fresh Air Fund Society was founded in 1889 with the object of sending Copenhagen children and adults into the country. The society Poor Children's Country Colonies was founded in 1892 with the object of providing for orphans by sending them to country colonies. Delicate Children's Open-air Colonies Supported by the Children's-Charity-Day Fund was founded in 1905. The Milk-distributing Society was founded in 1874 with the object of facilitating the procuring of sterilized milk for infants. The Society for the Protection of Infants combats children's diseases. The Society for Promoting the Welfare of Infants was founded in 1885 with the object of providing food and means of hygienic nursing for children under two years. The Society for the Care of Children distributes food to widows with children under four years of age. Numerous dinner-distributing societies provide dinners for children and adults free or at moderate charges. The Society for Improving School Hygiene was founded in 1903. Numerous rest and convalescent homes are maintained for children as well as for adults. Other agencies which should be mentioned are the Coöperative Society for the Erection of Dwellings for the Working Population, the Society of 1865 for Building Cheap Workmen's Cottages, the Tagensvej Workmen's Cottages, Workmen's Building Society, Classen's Cottages, the Medical Association's Cottages, etc., and the Danish Society for the Protection of Workmen, founded in 1906.

Public Measures for the Combating of Tuberculosis.

Besides the above-mentioned private measures, whose object is to combat tuberculosis directly or indirectly, very energetic public measures have been taken lately with the same object. In 1898 the Danish Medical Asso-

ciation obtained a Government grant to pay for the publishing of a short pamphlet on tuberculosis, which, besides being printed in 200,000 separate copies, appeared in the University Calendar for 1898, so that 400,000 copies in all were distributed free to medical men, at infirmaries, chemists' shops, at all railway stations, at schools of every description, at factories, workshops, etc. At the same time 10,000 lithographed metal placards with a few brief instructions for guarding against tuberculosis were hung up in public and private buildings in all parts of the country.

On May 11, 1897, notification of cases of tuberculosis was made compulsory by Act of Parliament, which act was, however, repealed March 31, 1900, as it did not work satisfactorily.

By the Prevention of Infectious Diseases Act of March 31, 1900, disinfection of premises where persons who have died from tuberculosis have stayed permanently, and notification of deaths from tuberculosis were made compulsory, the expenses of such measures being borne by the State.

Under the Poor Relief Act of April 9, 1891, No. 67, Sec. 61, amended by act of Parliament of March 20, 1901, municipal grants toward the education, support, maintenance, treatment, and nursing of scrofulous, tuberculous persons suffering from lupus are not to be looked upon as poor relief, if the person in question is treated in hospitals or sanatoriums maintained or recognized by the State.

By order of the Minister of Public Works placards prohibiting expectoration on the floor are to be found in all government railway carriages, waiting-rooms, steamers, etc.

By Act of Parliament of 1901 measures were taken for combating tuberculosis among cattle and pigs.

On November 18, 1901, a Commission was appointed by Royal Order to give their opinion as to how endeavors to combat tuberculosis might be supported by the State, partly by legislative measures, partly by suitable grants. The chairman of the National Association, V. Oldenburg, Lord Mayor of Copenhagen, was elected to the chairmanship of this Commission, which in December, 1902, submitted its report to the Rigsdag (Danish Parliament) recommending the passing of two bills, which were two years later passed in all essentials in the form recommended by the Commission. These two acts form the basis of the rapid progress made in Denmark during the last years in fighting tuberculosis, and with one stroke, as it were, raised Denmark to preëminence among the countries combating this disease. Here follow the two acts:

Prevention of Tuberculosis Act of April 4, 1905.

Sec. 1.

The health commissions and epidemic commissions mentioned in the Prevention of Infectious Diseases Act No. 43 of March 31, 1900, shall, under

control of the chief health commissions mentioned in the same Act, direct the local measures for prevention of tuberculosis.

Sec. 2.

Every medical practitioner shall according to the rules laid down for this purpose by the Royal Board of Health send in a report to the town or district doctor on all the cases of tuberculosis of the lungs or the larynx which are treated by him. These reports shall be drawn up on forms sanctioned by the Board of Health, containing among other things information as to the name, age, position, and residence of the patients and which by provision of the Ministry of Justice shall be supplied gratis to medical practitioners.

Every medical practitioner shall send in a similar report on the cases that are being treated by him at the time of the taking effect of this Act.

Sec. 3.

When a person dies from either of the forms of tuberculosis mentioned in Sec. 2, the medical practitioner who was treating the person in question at the time of his death or in case of the person in question not having been under medical treatment, the medical man or the post-mortem examination officers who examine the body, shall as soon as possible notify the death to the health commission (epidemic commission) in question.

Sec. 4.

The health commission (epidemic commission) shall be entitled to order the cleaning or disinfection of such premises as have been inhabited permanently by persons who have died from either of the forms of tuberculosis mentioned in Sec. 2, as well as of the wearing apparel or bedding used by such persons.

Wearing apparel and bedding used by such deceased persons shall not, contrary to the prohibition of the medical man in question or the health commission, be used, given away, or sold without being first duly disinfected.

Sec. 5.

Furthermore, when a person suffering from either of the forms of tuberculosis mentioned in Sec. 2 has moved away from premises inhabited permanently by him, the health commission (epidemic commission) shall, if the medical man who has treated the patient recommends such measures, be entitled to order the cleaning or disinfection of the premises in question, and the commission shall also be entitled to order such cleaning or disinfection whenever it at any other time may find occasion to do so.

Sec. 6.

If it come to the knowledge of the health commission (epidemic commission) that a person suffering from either of the forms of tuberculosis mentioned in Sec. 2 lives under such conditions or that the conditions in his dwelling be such as to be favorable to the transmission of the disease to other persons, the commission shall be entitled to take measures to prevent this. If the sick person refuses to comply with the measures taken by the

health commission, the commission shall be entitled to appeal to the chief health commission, whose decision shall be final. No measures involving a sick person's compulsory relinquishment of his employment against his will, or the cessation of co-habitation in the case of married couples, shall be enforced. Every person who under the section in question is sent to a hospital shall be treated at the joint expense of the State and the local Municipal Body. (Sec. 14, paragraph II.)

Sec. 7.

The health commission (epidemic commission) shall be entitled to prohibit women suffering from tuberculosis from taking service as wet-nurses.

Sec. 8.

No municipal council (health commission) shall, according to Act No. 43 of March 1, 1895, regarding the inspection of children boarded out, give any person permission to take charge of a child before a doctor's certificate is produced stating that the house in question is free from tuberculosis of an infectious nature, as well as that the child in question, if it is to be received in a family with children, is not suffering from the said disease.

Sec. 9.

The premises and the school-desks and forms, etc., of all public as well as private schools shall be kept duly cleaned and kept free from dust and dirt.

The Ministry of Ecclesiastical Matters and Public Instruction shall issue regulations as to this cleaning as far as the state-schools are concerned.

As for the board-schools, each municipal council shall after consulting together with the school-commission work out proposals for detailed regulations for the cleaning of its schools, which proposals shall be submitted to the school-board. Should the board refuse to ratify the proposals, they are to be submitted to the Ministry of Ecclesiastical Matters and Public Instruction for final decision. Every municipal body shall take care that the premises of its schools are kept clean according to the ratified regulations and to pay the expenses of such cleaning. The obligations of the municipal body do not, however, include the airing of the school-rooms, which is the duty of the teacher in question. The school-commission shall ascertain that the provisions of the regulations are obeyed in every particular.

As for the private schools, the health commission shall take care that proper measures are taken for the cleaning of the school premises. It shall not, however, be incumbent on private schools to do more in this respect than what is required of public schools of the same kind. The final decision as to such questions rests with the Ministry of Ecclesiastical Matters and Public Instruction.

Sec. 10.

If it come to the knowledge of a teacher that there is any case of tuberculosis among the children of his school, he shall notify this fact to the school commission, who shall then place the child under special observation and—if the disease be declared by doctor's certificate to be infectious—apply to the school-board to decide whether the child ought to be released from attending school. If the child be released from attending school, the school board shall

decide whether suitable instruction may be imparted to the child in question in another way. One-fourth of the expenses of such instruction shall be paid by the municipal body, three-fourths by the State.

Sec. 11.

No teacher shall be appointed at any public school before producing a doctor's certificate issued within the last three months, stating that he does not suffer from infectious tuberculosis of the lungs or the larynx.

Every teacher who is dismissed through suffering from infectious tuberculosis of the lungs or the larynx shall receive a pension amounting to two-thirds of the salary he received at the time of his dismissal.

Similar regulations shall apply to such other government officials and functionaries as by virtue of their office are in so close contact with the people as to expose them to the dangers of infection of tuberculosis of the lungs and larynx.

The expense of pensions granted according to the provisions of this section shall be borne by the State as far as government officials and functionaries are concerned; as far as municipal officials and functionaries are concerned, by the municipal body in question as well as by the school fund. Should the person in question be cured so that he may be considered free from infection and he reënters the public service for which he receives a salary, his pension shall be stopped altogether or shall be reduced in proportion to his present salary. The pension of any person who, after having been cured, refuses to accept a public office, corresponding to the one he formerly filled and with at least the same income, shall also be stopped.

Sec. 12.

Every person who, during compulsory military service, is proved to be suffering from infectious tuberculosis, shall be entitled to admission to a tuberculosis hospital. His stay at the hospital shall not, however, extend beyond the term of his military service.

Sec. 13.

Persons suffering from either of the forms of tuberculosis mentioned in Sec. 2 shall only be admitted to such workhouses and municipal almshouses as are provided with separate rooms reserved for tuberculous persons.

Sec. 14.

The expenses attendant on the cleaning and disinfection performed according to the provisions of Sections 4 and 5 shall be borne by the same public bodies that pay the expenses mentioned in Section 25 of the Prevention of Infectious Diseases Act of March 31, 1900.

Three-fourths of the expenses attendant on the treatment and maintenance of tuberculous persons according to Sec. 6 shall be paid by the State, one-fourth by the municipal body in question, the total expense amounting to kr. 2.50 per day.

Sec. 15.

The Ministry of Justice shall take measures for the dissemination of information on the nature of tuberculosis, on the causes of its origin, and on

common precautions against this disease. The expenses attendant on such measures shall be paid by means of yearly government grants.

Sec. 16.

Offenders against the provisions of this Act or against general or special injunctions granted according to the same shall—if they do not incur greater penalties under the ordinary laws—be liable to a fine of from 2 to 2000 kr. or to imprisonment according to Section 25 of the civil penal law. Such fines shall accrue to the exchequer.

The proceedings in these cases shall be summary.

Sec. 17.

This Act shall remain in force until April 1, 1912, if it has not before that time been revised by the legislative power.

The government shall be authorized to declare this Act in force, by royal ordinance, on the Faroe Islands, with such amendments as may be rendered necessary by the conditions peculiar to these islands.

Act of April 4, 1905, regarding Government Grants to Tuberculosis Hospitals as well as toward the Treatment of Patients in the same.

Sec. 1.

According to the rules laid down in this Act, government subsidies may be granted to such tuberculosis hospitals and nursing homes as have been recognized by the State and are under the inspection of the Ministry of Justice, as well as toward the treatment of patients in the same. The State recognition may be granted by the Rigsdag (Parliament) on the recommendation of the Committee on Ways and Means, the institution in question having been previously subjected to an investigation on the part of the Ministry of Justice.

Sec. 2.

The following institutions shall be entitled to State recognition:

1. *Seaside hospitals,* which in this Act shall mean hospitals situated on or near the sea, and where none but, *or preferably,* children under fifteen suffering from grave forms of scrofulous diseases are admitted.

2. *Seaside sanatoriums,* which in this Act shall mean sanatoriums situated on or near the sea and where none but, or preferably, children under fifteen suffering from light forms of scrofulous diseases are admitted.

3. *Public sanatoriums,* which in this Act shall mean sanatoriums where none but patients suffering from pulmonary tuberculosis, in an early stage of the disease, are admitted.

4. *Tuberculosis hospitals,* which in this Act shall mean hospitals or hospital-wards in separate buildings, where none but patients suffering from phthisis in various stages, preferably such as from special, often only temporary, circumstances cannot profit as much as they ought to from the treatment at a sanatorium.

5. *Convalescent homes,* which in this Act shall mean homes under medical inspection for such patients as have been discharged from tuberculosis hospitals and sanatoriums recognized by the State, being, however, still unable to perform their usual work without risking a relapse.

6. *Nursing-homes for persons suffering from phthisis,* which in this Act shall mean nursing-homes under medical inspection for such persons suffering from pulmonary tuberculosis as are able to work and for whom a stay at a sanatorium or hospital cannot be considered necessary.

Sec. 3.

To obtain recognition by the State a seaside hospital or public sanatorium shall have room for at least 20 patients, a seaside sanatorium or a tuberculosis hospital or a convalescent home for at least 10, and a nursing-home for at least 5 patients, and the charges per day for each patient shall not—including State and municipal grants—exceed kr. 2 at seaside hospitals, kr. 1.20 at seaside sanatoriums, kr. 3 for adults and kr. 2 for children at public sanatoriums, kr. 2.50 for adults and kr. 1.66 for children at tuberculosis hospitals, and kr. 1.20 at convalescent and nursing-homes.

Sec. 4.

Until the revision, mentioned in Sec. 11 of this Act, has taken place, hospital wards (Sec. 2, paragraph 4), established in the buildings of public hospitals existing at the time of the taking effect of this Act, shall be entitled to State recognition as tuberculosis hospitals on the conditions mentioned in Section 1. These wards shall have a separate entrance and shall be strictly isolated from the other parts of the hospital in question and shall have room for at least 6 patients.

Sec. 5.

According to regulations issued by the Ministry of Justice and within the limits fixed by the provisions of Section 9, government subsidies shall be granted to the hospitals, convalescent homes, and nursing-homes, recognized by the State, mentioned in Sections 2 and 4, to an amount of kr. 1.50 per day for each of the patients mentioned in Section 6 at seaside hospitals, 90 øre at seaside sanatoriums, kr. 2.25 for adults and kr. 1.50 for children at public sanatoriums, kr. 1.85 for adults and kr. 1.25 for children at tuberculosis hospitals, and 90 øre at convalescent and nursing-homes.

No patient staying at a convalescent home shall be entitled to State support for any period exceeding two months.

Sec. 6.

Patients who are members of sick-clubs recognized by the State, and their children under fifteen, or whose economic situation is such that they or their maintainers according to Sec. 6 of the Act of April 12, 1892, regarding recognized sick-clubs, may become members of a recognized sick-club, as well as patients who are so situated that they or their maintainers are unable to afford the expenses of treatment in one of the institutions mentioned in Sections 2 and 4, shall be entitled to State support according to Sec. 5. No patient who is not a native of Denmark or naturalized or who has not been domiciled in Denmark during the last year before his admittance to one of the said institutions shall be entitled to State support.

Questions bearing on the right of patients, who are not members of recognized sick-clubs, to claim State support, shall be decided by the superior legal authorities, with right of recourse to the Ministry of Justice.

Sec. 7.

Government and municipal grants toward the support of necessitous tuberculous persons in institutions mentioned in this Act as well as toward their traveling expenses to and from the institution shall not be looked upon as poor relief. The same rule shall apply to government and municipal grants toward the support of families, whose maintainers are residing as patients in the said institutions.

Sec. 8.

Besides the patients who receive State support according to Sec. 6, such patients as without receiving State support declare themselves willing to pay for two months in advance or to find security for the payment of the charges mentioned in Sec. 3 shall in preference to others be entitled to admittance to the institutions mentioned in Sections 2 and 4, but only in case of their being so situated that neither they themselves nor their maintainers can afford to pay for treatment, in institutions where the charges are higher than those fixed in Sec. 3. Questions as to whether this condition may be said to exist shall be settled as appointed in Sec. 6, paragraph II.

If several patients, who according to the above-mentioned rule are entitled in preference to others to admission to institutions recognized by the State, present themselves for admission at the same time, the selection shall be made according to the same rules as would apply to a selection among patients living under the same economic conditions.

Sec. 9.

Every year the Rigsdag (Parliament), on the recommendation of the Committee of Ways and Means, shall decide how great a subsidy is to be granted by the State toward the treatment of patients in each of the hospitals and nursing-homes mentioned in Sections 2 and 4.

A sum of 100,000 kr. shall be placed at the disposal of the Minister of Justice for the fiscal year 1905–06, and for each of the succeeding four fiscal years toward the erection and extension of tuberculosis hospitals, and any part of the sum that is not spent in one fiscal year may be carried over to the next.

Of the said sum, a subsidy not exceeding 1250 kr. per bed shall be granted toward the erection and fitting-up of the building in question, not including, however, the sum paid for the site, as half of the expenses for each patient, for whom there is to be accommodation in the hospital in question or in the extension of the same, provided that detailed plans and estimates be submitted to and accepted by the Ministry of Justice before the beginning of the erection or extension of the building. The aforesaid sum of 1250 kr. shall be increased or diminished proportionally to any considerable rise or fall of prices of building materials and workmens' wages. If a tuberculosis hospital in receipt of a subsidy from the State should be used for any other purpose, the subsidy received shall be paid back to the State.

Every year the Rigsdag, on the recommendation of the Committee of Ways and Means, shall decide how great a subsidy is to be granted by the State toward the erection or extension of other hospitals for tuberculous persons.

Sec. 10.

Hospitals and nursing-homes which according to this Act have obtained State recognition are under the control of the Ministry of Justice, assisted by such persons as it may be found necessary to appoint for this purpose. Should the regulations issued by the Ministry of Justice not be carried out, the latter shall be entitled to deprive the hospital or nursing-home in question of the State recognition.

The expenses attendant on the control shall be paid by supplies granted every year by the Rigsdag on the recommendation of the Committee on Ways and Means.

Sec. 11.

This Act shall be laid before the Rigsdag for revision before the end of the year 1911.

The government shall be authorized to declare this Act in force by royal ordinance on the Faroe Islands, with such amendments as may be rendered necessary by the conditions peculiar to these islands.

As a result of these acts a very great number of sanatoriums, seaside hospitals, seaside sanatoriums, and tuberculosis hospitals have been built in all parts of the country; already existing institutions have been extended and improved and new ones are being erected or planned, so that Denmark in proportion to its size is now the country with the greatest number of hospitals for the treatment of tuberculosis, where patients may be treated at a practically nominal cost.

PUBLIC SANATORIUMS RECOGNIZED BY THE STATE.

1. *Boserup Sanatorium.*—The Boserup Forest sanatorium was built at the expense of the municipality of Copenhagen and was opened in the spring of 1901. The sanatorium is situated in the southwestern part of Boserup Forest, about 6 kilom. from Roskilde, and covers with its surrounding grounds about 80 acres of land, formerly part of the forest. There are two separate buildings, one for either sex, with room for, in all, 152 patients (17 in private rooms and 135 in common wards). The cost of the erection of the sanatorium amounted to about 550,000 kr.; the cost of the fitting up, to about 100,000 kr.; in all, about 650,000 kr.

Only such patients as have been domiciled in Copenhagen for at least one year and are entitled to parish relief there, and who suffer from phthisis (pulmonary tuberculosis) in the early stages, are admitted to this sanatorium. The charges are kr. 3.00 per day for adults and kr. 2.00 for children. Patients who receive State support pay only kr. 0.75 for adults and kr. 0.50 for children. For patients who are members of sick-clubs recognized by the State and their children the charges are respectively kr. 0.60 and kr. 0.30 per day during the first thirteen weeks, after which time they are treated gratis for thirteen weeks, thus alternating between paying and gratis periods

of thirteen weeks as long as their expenses are borne by the sick-club to which they belong.

2. *The Lille-Strandvej Hellerup Consumption Sanatorium* is a public sanatorium recognized by the State, with 20 beds, chiefly admitting patients who are members of sick-clubs and necessitous persons. The sanatorium is situated at Hellerup, in the immediate vicinity of Copenhagen.

The Sanatoriums of the National Association.

1. *Silkeborg Sanatorium.*—Silkeborg Sanatorium is the largest sanatorium of Denmark, having room for 173 patients. The sanatorium is very beautifully situated, about 2 kilom. from Silkeborg, near the lakes Brassø and Vejlsø. The park and the gardens cover 40 acres of land, formerly part of the adjoining forest, much of which is thrown open to the sanatorium patients by permission of the State. The sanatorium was built 1902–03, after the block-system. The expenses of the erection of this sanatorium, amounting to about 482,098 kr., or about 2792 kr. per bed, were defrayed by the National Association. Only men are admitted.

2. *Ry Sanatorium* was built in the year 1903. It stands in a beautiful plantation of pine trees, about 2 kilom. from Ry station, and there are besides 27 acres of land belonging to it, bounded on the west by the River Gudenaa, which here has a considerable width. Only women are admitted. The sanatorium has room for 38 patients, and the cost of the erection amounted to 102,624 kr., or about 2700 kr. per bed.

3. *Haslev Sanatorium* stands on the outskirts of the beautiful forests belonging to the estate of Bregentved, about 3 kilom. from the town of Haslev, on a site presented by Count Moltke-Bregentved. The sanatorium was built in 1903 and has room for 24 patients. Only women are admitted. The cost of the erection amounted to 95,520 kr., or about 3980 kr. per bed.

4. *Skorping Sanatorium* was built in 1905–06. It stands in the large Rold-Forest near the country town of Skørping, in the north of Jutland, and has room for 123 patients. Only women are admitted. The cost of the erection amounted to 500,634 kr., or about 4070 kr. per bed.

5. *Nakkebolle Sanatorium,* on the Nakkebølle fiord, was built 1907–08. It is beautifully situated in a wood close to the sea, near the country town of Pejrup, about 10 kilom. from the town of Faaborg. It has room for 122 patients. Only women are admitted. The cost of the erection of this sanatorium was 600,000 kr., or about 5000 kr. per bed.

Sanatoriums of the Coöperative Sanatorium Association.

1. *Krabbesholm Sanatorium* was built in 1906. It stands at Skive fiord, near the old manor house of Krabbesholm, about 3 kilom. from the town of Skive in Jutland. About 67 acres of the woods belonging to the manor

house have been bought by the sanatorium for the purpose of laying out a park and garden. The sanatorium has room for 114 patients of either sex. The cost of the erection amounted to 400,000 kr., or 3410 kr. per bed.

2. *Faksinge Sanatorium* was built 1906–07. It stands in the beautiful Faksinge Forest, near the little creek "Even," running inland from Praestö Bay, about 4 kilom. from the town of Praestö, in Sealand. The park and garden of the sanatorium cover about 80 acres of land, formerly part of the forest. The sanatorium, which is provisionally carried on by the National Association, has room for 120 patients. Only men are admitted. The cost of the erection was 600,000 kr., or about 5000 kr. per bed.

The charges at these public sanatoriums, recognized by the State, are per day for adults 3 kr. and for children 2 kr., of which three-fourths are paid by the State in the case of members of sick-clubs, necessitous persons, and persons whose economic condition is not such as will enable them to pay the expenses of a stay at a sanatorium out of their own means.

There is room in the above-named public sanatoriums for about 900 (886) patients in all. When two more sanatoriums, one at Thorshavn in the Faroe Islands with 20 beds, and the Sct. Joseph Sister's Sanatorium at Esbjerg, with 70 beds, which are in course of erection, are finished, Denmark will have public sanatoriums recognized by the State, capable of accommodating about 1000 patients, where necessitous persons may be treated for 75 øre per day for adults and 50 øre per day for children.

In addition to these, there is a great number of private sanatoriums, where the charges are also very moderate.

Private Sanatoriums.

Vejlefiord Sanatorium, which is the oldest of the more important sanatoriums of Denmark, was opened in March, 1900. Its erection is chiefly due to the energetic efforts of Professor Saugmann, the present medical superintendent of the sanatorium. In 1895 he gave a lecture by which he succeeded in interesting the Danish Medical Association so much in his plan that they subscribed a sum of 1000 kr.; Danish medical practitioners subscribed 43,000 kr.; contributions to an amount of 200,000 kr. were received from private persons, and in 1896–97 the Rigsdag, on the recommendation of the Committee of Ways and Means, granted a subsidy of 100,000 kr. as a present toward the erection of the sanatorium. A site of 111 acres of land was then bought at Fakkegrav near Vejlefiord, where the sanatorium was built.

The sanatorium is the property of the company "Consumption Sanatoriums," and receives patients of the well-to-do classes from all parts of Denmark. Children under ten years of age are received only when accompanied by adults. Both men and women are admitted, and there is room for, in all, 95 patients. The charges are 7 to 8 kr. per day for private rooms and

6 kr. 50 øre per day when two patients share a room. There are 61 private rooms and 17 two-bedded rooms.

Persons who cannot afford, out of their own means, to pay the charges of the sanatorium are by bequests and support from the State enabled to stay at the sanatorium at a moderate cost.

The expenses of the erection, including the sum paid for the site and the fitting-up of the sanatorium, amounted to 785,500 kr., or about 8500 kr. per bed.

The annual working expenses amount to about 225,000 kr. The expenses for each patient amount to about 6 kr. 85 øre per day.

Helsebo Sanatorium near Odense was built in 1896 at the expense of the Copenhagen Deaconesses' Institution.

The institution was first intended for a "recreation home," but by and by patients suffering from tuberculosis in its early stages were also received. Since 1903 none but persons suffering from phthisis have been treated here.

The sanatorium is situated 4 kilom. from Odense, in a wood of 53 acres, sheltered from the north and west winds. There is room for 18 patients of either sex. The charges are 2 kr. 75 øre for a private room, for a bed in the common ward 2 kr. 25 øre per day.

The cost of the erection, not including the sum paid for the site, amounted to about 40,000 kr., or 2200 kr. per bed.

Dalum Kloster Sanatorium was established in the old Dalum Kloster (convent) in the vicinity of Odense, at the expense of the St. Hedvig Sisters. Only women suffering from tuberculosis in all stages are admitted. There is room for 35 patients. The charges vary from 3 kr. 50 øre to 5 kr. per day; patients are, however, sometimes received at reduced charges.

Dr. Bang's Private Sanatorium near Silkeborg was built in 1905, with room for 20 patients. The charges vary from 4 kr. 50 øre to 6 kr. per day.

The Consumption Sanatorium "Oresundshoj" at Ordrup near Copenhagen, with room for 14 patients, receives persons suffering from phthisis in its early stages. The charges are 4 kr. 50 øre for a private room, 3 kr. for a bed in the common ward.

The Hellerup Consumption Sanatorium at Hellerup, near Copenhagen was built in 1899, with room for 12 patients, and receives persons suffering from phthisis in its early stages. The charges vary from 4 to 6 kr. per day.

The Sanatorium "Solbad," in the parish of Sölleröd, about 15 kilom. from Copenhagen, with room for 18 patients, receives persons suffering from light forms of tuberculosis and patients to whom the country air is necessary for a complete cure. The charges vary from 4 kr. 50 øre to 5 kr. per day.

The Sanatorium "Bakkely," near the town of Kallundborg, with room for 24 patients, receives persons suffering from tuberculosis and scrofulous

diseases. The charges are 2 kr. 50 øre per day. The sanatorium is partly supported by the State and partly by the county of Holbaek.

The Sanatorium "Skovbrynet," at Fakkegrav, near Damgaard railway-station, has room for 12 patients. The charges vary from 4 kr. to 4 kr. 50 øre per day.

The "Ronde" Sanatorium near Kalövig in Jutland, receives only women. There are 12 beds in all, 8 for women suffering from phthisis in its early stages, 4 for convalescents. The charges vary from 100 kr. to 110 kr. per month.

Besides the above-named private sanatoriums with, in all, 260 beds for patients of the well-to-do classes, there are some private nursing-homes for persons suffering from tuberculosis.

Tuberculosis Hospitals.

A great number are finished, while some are in course of erection and others only planned.

Sealand.—Copenhagen: at the Øresunds Hospital is a tuberculosis ward containing 200 beds; at Frederiksberg Hospital, a ward containing 52 beds; at Roskilde Hospital, a ward containing 12 beds; at Lyngby Hospital, a ward containing 24 beds; at Faxe Hospital, a ward containing 7 beds; in all, 295 beds.

At Naestved Hospital there is, besides, planned a ward containing 24 beds; at Vordingborg Hospital, a ward containing 12 beds; at Holbaek Hospital, a ward containing 24 beds; in all, 60 beds.

Bornholm.—At Rønne is a tuberculosis hospital containing 36 beds.

Lolland Falster.—As a provisional arrangement 20 beds of the epidemic hospital at Nakskov are reserved for patients suffering from tuberculosis. At Maribo a hospital containing 40 beds is planned.

Funen.—At Svendborg is a tuberculosis hospital containing 33 beds; at Assens a tuberculosis hospital containing 20 beds; in all, 53 beds.

At Odense Hospital there is, besides, planned a ward containing 48 beds; at Nyborg Hospital, a ward containing 10 beds; in all, 58 beds.

Jutland.—Tuberculosis hospitals in Jutland, finished or in course of erection:

Location of Hospital.	Number of Beds.
Hjorring	22
Aalborg	20
Ebeltoft	26
Horsens	18
Kolding	24
Hornsyld	12
Give	16
Ringkjobing	12
Holstebro	26
Tarm	10
Ribe	20
Esbjerg	20
Total	226

Hospitals planned:

Location of Hospital.	Number of Beds.
Aalborg	26
Logstor	10
Brouste	12
Frederikshavn	10
Thisted	18
Nykjobing	16
Koldby	10
Hvidbjerg	10
Fjerritslev	10
Vestervig	10
Odder	25
Braestrup	12
Vejle	24
Herning	10
Esbjerg	15
Total	218

The Faroe Islands.—At the tuberculosis hospital at Thorshavn in the Faroe Islands there is room for 30 patients, 10 of which are treated as hospital cases, 20 as sanatorium cases.

Children's Sanatoriums.

1. *The Refsnaes Seaside Hospital.*—This hospital, the oldest hospital of Denmark for the treatment of tuberculosis, was opened July 1, 1875, for scrofulous children from all parts of Denmark from the age of four or five, and besides for rachitic children from the age of two. There is room in the hospital for 130 children, and in the epidemic ward for 10. The charges are 2 kr. per day. Some children are received for 1 kr. per day and some quite gratis. Sums of money to the amount of 118,000 kr. have been bequeathed to the hospital by various persons.

The hospital stands on the south side of the headland of Refsnaes, about 2 kilom. from the town of Kallundborg, quite near the sea, and open to the south, while sheltered on the three other sides by high hills. It was erected by means of private subscriptions, and has later received government and municipal grants to a considerable amount, besides being largely supported by charitable institutions.

Since the hospital was opened it has repeatedly been improved and partly rebuilt. On December 31, 1906, the cost of the buildings and fittings amounted to 340,000 kr.

During the last four years the average expenses amounted to about 100,000 kr. yearly, or about 2 kr. 14 øre per day for each patient, and during the same period the average number of days of treatment of each patient discharged from the hospital was 412.

Results of the Treatment of Tuberculous and Scrofulous Patients Discharged During the Years 1875–1906 (Incl.) According to the Opinion of the Medical Superintendent at the Time of Their Discharge from the Hospital.

Number of Patients Discharged 1875–1906.	Class of Disease.	Number of Patients.			
		I. Cured.	II. Much Improved.	III. Improved.	IV. Unchanged or Worse.
909.....	I.	542	294	65	8
1013.....	II.	576	357	55	25
1130.....	III.	681	241	67	141
204.....	IV.	38	79	26	60
3256.....	....	1837	971	213	234

2. *The Juelsminde Seaside Hospital* admits children between four and fifteen, suffering from scrofulous and tuberculous diseases (pulmonary tuberculosis not included).

The hospital stands on a headland near the mouth of Vejlefiord and the Cattegat, about 2 kilom. from Juelsminde railway station; there are about 17 acres of land, most of which is laid out as a park, and a sandy and sloping beach, well adapted for bathing purposes.

The hospital is an independent philanthropical institution. It was erected 1901–02, partly by means of municipal grants and private subscriptions, partly by a government grant of 55,000 kr. The cost of the site, buildings, and fittings amounted to 112,000 kr., and there is room for 52 children.

In 1907–08, partly by means of government grants, two pavilions with room for 48 patients were added, so that the total amount expended is now 185,000 kr., or 1850 kr. per bed.

The hospital is open all the year round and the term of treatment is unlimited, *i. e.*, the children are not discharged until they are quite cured or until it is seen that they are not further benefited by their stay at the hospital.

The charges are 2 kr. pr. day. In accordance with the act regulating State subsidies to tuberculosis hospitals, as well as the treatment of patients at the same, 1 kr. 50 øre is paid by the State per day for such patients as fulfil the conditions mentioned in Sec. 6 of the said act, so that only 50 øre per day remains to be paid by the patients themselves.

During the last years the average term of treatment has been 280 days, and up till now about 60 children have been discharged yearly, 90 per cent. as cured or much improved, 10 per cent. without having benefited by the treatment.

The treatment is hygienic-dietetic. In summer the children bathe in the sea; in winter they have warm salt-water baths. When necessary, the

general treatment is assisted by conservative surgical and orthopedic local treatment.

3. *The Hellebaek Seaside Sanatorium* belongs to the society "The Copenhagen and Environs Children's Sanatoriums," whose object is to send delicate, especially tuberculous, children of the poor classes to a seaside sanatorium for gratis treatment of varying duration.

In 1895 the society bought a site north of Hellebaek, where a sanatorium with room for 35 children was built in 1896. The cost of the erection, including 6000 kr. paid for the site, amounted to 22,000 kr.

By means of a State subsidy of 42,000 kr. granted in the winter 1903, and several other grants—for instance, in 1906–07, 25,000 kr.—the sanatorium is now able to receive from 70 to 75 patients.

The total amount of the cost of erection is at present 60,000 kr., or 900 kr. per bed.

The society has from the time of its establishment provided treatment for the following number of children between the ages of four and fourteen:

	1890–95.	1896–1903.	1904–07.	1907.
Children	658	1,522	823	199
Days of treatment....	18,564	54,925	70,932	19,251

The expenses of the treatment amount to about 1 kr. per day.

From 1890 till the end of the year 1907 the society has spent about 217,000 kr., for the greater part collected by private subscriptions. Since 1906 the sanatorium has received a State subsidy of 90 øre per day for the treatment of scrofulous children (Act of April 14, 1905).

4. *The Seaside Sanatorium "Buddesminde" for Girls* stands on the outskirts of the Tofte Forest, near Sandbjaergvej, about 1 kilom. from Juelsminde railway station. A garden of 1 acre belongs to the sanatorium. It is the property of the "Danish Children's Homes Society," and has room for 16 girls between four and fifteen, suffering from light forms of phthisis (pulmonary tuberculosis). The sanatorium was opened in 1904. The charges are 1 kr. 20 øre per day, three-fourths of which are paid by the State in the case of the children of necessitous persons and of members of sick-clubs.

The term of treatment extends over about 120 days, and about 30 children have been discharged yearly, about 80 per cent. relatively cured or improved, about 20 per cent. with no result.

5. *"Buddesminde" for Boys.*—This sanatorium was also built at the expense of "Danish Children's Homes Society," and was opened in August, 1906. It stands in a very sheltered position on the southern outskirts of a forest of 133 acres, about 2 kilom. from Mørkøv railway station. A park of about 4 acres belongs to the sanatorium. The soil is dry and sandy. There are two separate buildings, and in the park are specially constructed

tents or sheds, where the patients may lie exposed to the open air. The sanatorium is recognized by the State. There is room for 16 boys between four and fifteen. Mostly children of necessitous parents are admitted, if they suffer from light forms of phthisis in the early stages; sometimes, however, children in the later stages of the disease are also admitted, provided they are well enough to be up. The charges are 1 kr. 20 øre per day.

The treatment consists of exercise in the open air, alternating with intervals of lying in specially constructed tents or sheds exposed to the air.

6. *The Children's Sanatorium at Snogebaek on Bornholm* is situated on the southeastern coast of the island of Bornholm. Properly speaking, it is not a sanatorium, but simply a fishing village, where scrofulous children are sent through the agency of the municipality of Copenhagen. The latter has hired a strip of ground on the beach and put up two "Døcker" tents for the accommodation of the children, who are boarded out to the inhabitants of the village for a period of three months. The expenses of medical attendance, medicine, and nursing—65 øre per day—are paid by the municipality of Copenhagen. Since the establishment of this institution in 1876 about 2000 children have been treated here with excellent results.

7. *The Home for Scrofulous Children at Odder* was started by the "Aarhus County Nursing and Children's Hospitals Society." The house stands in a big garden, surrounded by fields and woods. The children bathe in the sea near Hou, to which place they are conveyed by railway (gratis). There is a hospital with 20 beds, where scrofulous children are received. The charges are 30 øre per day, or about 180 kr. yearly. Subsidies from the State and the County of respectively 500 and 200 kr. yearly are granted.

Besides the above-named seaside hospitals and seaside sanatoriums with room for about 400 scrofulous and tuberculous children of necessitous parents, a large sanatorium for the treatment of poor children suffering from pulmonary tuberculosis is being built, viz.—

8. *The "Christmas Stamp" Sanatorium.*—On October 26, 1904, a committee was formed with the object of building a hospital for tuberculous children and to raise the necessary funds by issuing a stamp bearing the king's portrait. It was to be sold at a price of 2 øre and affixed to letters, especially at Christmas time. The first year 6 million stamps were issued, $5\frac{1}{4}$ million of which were sold, fetching a sum of 75,000 kr., and the committee continuing the issue of the Christmas stamp, a similar sum has been collected each succeeding year. After the necessary sum had been raised,—partly by the help of a Government grant,—the committee resolved to build a sanatorium of 121 beds for tuberculous children, and a very fine and suitable site on Kolding fiord was bought. When the sanatorium, which is at present in course of erection, is finished, it will be managed by the National Association for the Combating of Tuberculosis.

ACCOMMODATION FOR PATIENTS AT SANATORIUMS IN PROPORTION TO THE POPULATION OF DENMARK.

According to the last census Denmark has a population of:

Sealand	1,026,119
Bornholm	41,031
Lolland-Falster	108,029
Funen	289,046
Jutland	1,124,684
In all	2,588,919
The Faroe Islands	16,349

There are at present public sanatoriums recognized by the State accommodating about 1000 patients.

The total amount of the cost of erection of these sanatoriums is about 3,466,800 kr.

There are private sanatoriums, several of which receive patients at reduced charges, accommodating 260 patients.

In tuberculosis hospitals recognized by the State, the cost of erection of which amounts to 1,650,000 kr., there will soon be accomodation for 660 patients, and when the hospitals that have been planned are finished, there will be accommodation for 376 more.

Children's seaside hospitals and children's seaside sanatoriums recognized by the State, including the "Christmas stamp" sanatorium, which is at present in course of erection, accommodate in all 500 patients. The cost of erection of these hospitals and sanatoriums amounts to 1,260,000 kr.

It will thus be seen that Denmark, with a population of two and one-half millions, has accommodation at present for, in all, 2180 patients of the poorer classes at the various sanatoriums, tuberculosis hospitals, seaside hospitals, and seaside sanatoriums. The total amount expended on these institutions is estimated at 6,376,800 kr.

Medidas contra la Tuberculosis en Dinamarca.—(RÖRDAM.)

La tuberculosis no es especialmente prevalente en Dinamarca. La mortalidad de la tuberculosis pulmonar es de 1.5 por cada 1,000; y de todas las formas de la tuberculosis es de 2.0 por 1,000. La mortalidad á consecuencia de la tuberculosis pulmonar esta disminuyendo rapidamente; en 1876 la proporción de los casos fatales fue de 3.57 por 1,000, mientras que al presente es de 1.95 por 1,000 solamente. La tuberculosis ha sido activamente combatida en Dinamarca. Desde 1875 se construyo el primer hospital à las orillas del mar para los niños escrofulosos, el Hospital Refnaes, que puede acomodar á 130 pacientes. Desde esa fecha numerosos hospitales

se han construido á la orilla del mar, sanatorios y hospitales para tuberculosos, en donde el pobre recibe el tratamiento gratis ó parcialmente gratis.

Ademas de estas agencias, dedicadas á la cura de la tuberculosis, muches medidas preventivas tambien se han tomado. En 1.898 la Sociedad Medica Danesa publicó, por cuenta del Estado, unas pequeñas circulares sobre la tuberculosis, de los cuales se distribursieron 600,000 copias, mientras que ligeras instrucciones sobre la prevención de la tuberculosis se colgaron en todos los edificios publicos y en un numero de los privados también.

Ultimamente se han hecho numerosas leyes, las cuales directa ó indirectamente se relacionan con la prevención de la tuberculosis.

Las leyes sobre la tuberculosis del 14 de Abril de 1905, proveé la notificación obligatoria de todos los casos de tuberculosis pulmonar y tuberculosis de la laringe, desinfeccion de las casas después de la muerte del paciente, lo mismo que cuandó éste cambio de residencia. En el caso de que una persona tuberculosa falte en la observacion de los mandatos del Comisionado de Salud, esta será confinada á un hospital á cuenta del Estado.

De acuerdo con la circular publicada por el Ministro de los Trabajos Púbilcos, el escupir en los trenes, barcos, staciones, etc., es prohibido. Leyes y reglamentos se han hecho por medio de los cuales la venta de carnes, leche y otros productos de la alimentacion esta extrictamente bajo supervigilancia.

Cada doctor puede enviar el esputo por el examen del bacilo de la tuberculosis á cuenta del público.

Reglamentos han sido introducidos con relacion á la inspección de las factorias y talleres en cuanto á los arreglos sanitarios y condiciones de estos, los cuales prohiben el empleo de niños: Tambien leyes que regularizan el empleo de personas jóvenes y sus horas de trabajo.

De acuerdo á los estatutos y circulares del ministro de la Educatión, las escuelas privadas y publicas deben ser usadas solamente para los trabajos escolasticos, y leyes se han hecho para regularizar el arreglo exterior y interior, sanitación y limpieza.

Los niños que viven bajo ciertas condiciones desfavorables, que su salud esta en peligro, la ley tiene derecho á quitarlos del poder de sus padres y cuidar de ellos a cuenta del público.

De acuerdo con la ley del 14 de Abril, 1908, los niños estan protejidos desde su tierna infancia, a las personas tuberculosas no se les permite cuidar de ellos en calidad de enfermeras ó nodrizas. Los niños tuberculosos deben ser introducidos en las enfermarias, ni los alumnos deben tener contacto con los niños tuberculosos. Asilos y escuelas estan sujetos á la inspección de la Comision de Salud.

Personas jóvenes que intentan entrar en una factoría, deben primaramente presentar un certificado del médico al efecto de que no padesen de

tuberculosis. Cualqier conscripto que se encuentra afectado de tuberculosis durante su termino de servicio, tiene derecho al tratamiento en un sanatorio a cuenta del Estado.

De acuerdo con la ley, el estado suple las tres cuartas partes de los gastos del tratamiento y cuido de los pobres en los sanatorios públicos reconocidos, y ademas contribuye extensamente en la construcción de sanatorios y hospitales para tuberculosos.

Dinamarca, con una población de 2,500,000, tiene al presente sanatorios públicos en los cuales se puede acomodar a 1,000 personas, la construcción de estas instituciones cuestan 3,500,000 coronas. Sanatorios privados para la clase rica de la población pueden acomodar 250 personas. Los hospitales para tuberculosos pueden acomodar 660 personas, estos son mantenidos poe el Estado y se han gastado 1,600,000 coronas en la construcción de ellos. Hospitales capaces de acomodar 400 personas estan en construcción.

Hospitales á las orillas del mar, para los niños pobres, pueden acomodar cerca de 1,500 niños y la construcción de estos cuestan 1,300,000 coronas.

El total gastado en la construcción de establecimientos de salud para los tuberculosos de la clase pobre es cerca de 6,300,000 coronas.

La asistencia que se les da a los pacientes tuberculosos de la clase pobre no es mirada como socorro de pobres.

Ademas, muchas asociaciones se han fundado en Dinamarca con el objeto de enviar á las personas tuberculosos al campo por un tiempo prolongado, de ayudar á los niños pobres, de promover la construcción de habitaciones para los obreros.

Massnahmen zur Ausrottung der Tuberkulose in Dänemark.—(RÖRDAM.)

Die Tuberkulose ist in Dänemark nicht besonders verbreitet. Die jährliche Mortalitätsrate in Folge von Lungentuberkulose ist 1.5 per Mille; von sämmtlichen Abarten der Tuberkulose 2.0 per Mille. Die Mortalitätsziffer nach Lungentuberkulose ist in rapider Abnahme begriffen; im Jahre 1876 betrug der Perzentsatz der Todesfälle 3.57 per Mille; während die Proportion gegenwärtig blos 1.95 per Mille erreicht. Die Tuberkulose wird in Dänemark seit langem energisch bekämpft. Schon im Jahre 1875 wurde das erste Marine-Hospital für skrofulöse Kinder das Refsnaes Marine-Hospital mit Raum für 130 Kinder errichtet. Seither wurden zahlreiche Marine-Hospitäler und Sanatorien, sowie Tuberkulose-Hospitäler und Sanatoriem gegründet, in denen Unbemittelte kostenlos oder für geringe Bezahlung gepflegt werden.

Diesen Institutionen, die Heilung der tuberkulösen Kranken bezwecken,

reihen sich zahlreiche Präventiv-Massnahmen an. Im Jahre 1898 publizirte die Dänische Ärzte-Gesellschaft auf Staatskosten eine kurze Abhandlung über Tuberkulose, die in 600,000 Exemplaren vertheilt wurde; ausserdem wurden an sämmtlichen öffentlichen Anstalten, sowie an zahlreichen Privatgebäuden kurze Instructionen zur Verhütung der Tuberkulose affichirt.

Späterhin wurden Gesetze geschaffen, die durch ihre Massnahmen insgesammt direkt oder indirekt die Verhütung der Tuberkulose bezweckten.

Das Tuberkulose-Gesetz vom 14 April, 1905, bestimmt die obligatorische Anzeige sämmtlicher Fälle von Lungen- und Kehlkopftuberkulose, die obligatorische Desinfection nach jedem Todesfalle in Folge von Tuberkulose, sowie Desinfektion, wenn vom Arzte verfügt, nach jedem Wohnungswechsel eines Tuberkulösen. Im Falle Nichtbefolgung der Vorschriften der Gesundheits Commission kann der Kranke auf öffentliche Kosten in ein Krankenhaus untergebracht werden.

Laut einem Erlasse des Ministers für öffentliche Arbeiten ist das Expectoriren in Eisenbahnwaggons, Schiffen, Stationen u. s. w. verboten. Gesetze und Vorschriften stellen den Verkauf von Fleisch, Milch, und anderen Nahrungsartikel unter strenge Aufsicht.

Aerzte haben das Recht, das Sputum ihrer Kranken kostenfrei auf Tuberkelbazillen untersuchen zu lassen.

Es sind Verfügungen getroffen worden, laut denen Fabriken und Werkstätten auf ihre Gesundheitszustände untersucht werden; andere verbieten die Beschäftigung von Kindern; auch bestehen Gesetze, welche das Anstellen von jungen Personen und deren Arbeitszeit reguliren.

Laut Bestimmungen des Unterrichtsministers können öffentliche sowohl als Privatschulen blos zu Unterrichtszwecken benützt werden; einschlägige Vorschriften sorgen für deren innere und äussere Ausstattung, Lage und Reinhaltung.

Kinder, die unter sanitätswidrigen Verhältnissen leben, können behördlich aus dem Elternhause entfernts und auf öffentliche Kosten erzogen werden.

Das Tuberkulose-Gesetz vom 14 April, 1905, beschützt die Kinder schon vom zarterben Alter an, indem es tuberkulösen Personen verbietet, Ammendienste zu leisten. Tuberkulöse Kinder dürfen in Säuge-Anstalten nicht aufgenommen werden und Nährlinge dürfen nicht mit tuberkulösen Kindern in Berührung kommen.

Asyle und Schulen sind der Aufsicht der Gesundheits-Commission unterworfen. Tuberkulöse Kinder werden in den öffentlichen Schulen nicht zugelassen; Lehrer, die an Tuberkulose leiden und Infektion verbreiten können, werden mit Pension entlassen.

Junge Leute, die sich in den Fabriken um Arbeit bewerben, müssen

ein ärztliches Attest vorweisen, das sie von Tuberkulose freispricht. Rekruten, die während ihrer Dienstzeit an Tuberkulose erkranken, können Behandlung in einem Sanatorium auf Staatskosten beanspruchen.

Laut demselben Gesetze trägt der Staat drei Viertel der Ausgaben, die mit der Behandlung und Pflege der Armen in anerkannten öffentlichen Sanatorien verbunden sind und hat des weiteren reichlich zur Errichtung von Sanatorien und Tuberkulose Hospitälernbeigetragen.

Dänemark, mit einer Population von 2,500,000 Inwohnern, besitzt gegenwärtig öffentliche Sanatorien, die 1000 Patienten zu versorgen im Stande sind und deren Errichtung 3½ Millionen Kronen gekostet hat. Privat-Sanatorien für die bemittelte Klasse haben Raum für weitere 250 Patienten. Die Tuberkulose-Hospitäler, mit Accommodation für 660 Kranke, werden vom Staate erhalten und werden mit einem Kostenaufwande von 1,600,000 Kronen erbaut. Auch sind gegenwärtig Hospitäler zur Aufnahme von weiteren 400 Patienten im Bau ergriffen.

Die Marine-Hospitäler haben Raum für ungefähr 1500 arme Kinder; ihre Errichtung kostete 1,300,000 Kronen.

Der Gesammtbetrag, der auf die Errichtung vom Sanitatsanstalten für Tuberkulotiker der ärmeren Klasse verausgabt wurde, beläuft sich auf 6,300,000 Kronen.

Die den Tuberkulotikern der ärmeren Klasse zukommende Beihilfe wird nicht als Krankenunterstützung betrachtet.

Neben all diesen Institutionen bestehen in Dänemark zahlreiche Gesellschaften, durch deren Beistand Tuberkulotikern ein längern Landauenthalt ermöglicht wird, arme Kinder unterstützt werden, die Errichtung entsprechender Arbeiterwohnungen angestrebt wird und die auf verschiedenen anderen Wegen die Tuberkulose zu bekämpfen suchen.

Kurz, Dänemark ist zweifellos eines jener Länder, in denen der Kampf gegen die Tuberkulose mit aller Energie geführt wird.

The paper by Dr. B. Patrikios, Secretary of the Superior Board of Health, of Greece, was presented by His Excellency, Mr. Coromilas, the Grecian Minister. In presenting the paper His Excellency remarked that his government hoped to hold a national congress against tuberculosis next year, and that he and his government anticipated invaluable aid from the reports of this International Congress.

LA LUTTE CONTRE LA TUBERCULOSE EN GRÈCE.

PAR LE DR. B. PATRIKIOS,

Membre et Secrétaire du Conseil Supérieur d'Hygiène de Grèce, Médecin-Directeur du Dispensaire Antituberculeux d'Athènes, etc.

I. MARCHE DE LA TUBERCULOSE EN GRÈCE DE 1890 À 1907 (ANNÉE COMPRISE).

En Grèce, le public croit, depuis les temps les plus reculés, à la propagation par contagion de la tuberculose et surtout tout particulièrement, à l'hérédité. Pourtant malgré toutes ces convictions populaires aucune attention n'est accordée même de nos jours au mode de transmission de la maladie et aux moyens de prophylaxie contre cette affection. Voilà pourquoi cette maladie se propage et se répand toujours de plus en plus. Aussi, sans remonter à des époques très anciennes, sur lesquelles les renseignements fournis par la statistique seraient peut-être contestables on trouvera ci-dessous trois tableaux qui font connaître, à partir de 1890, la progression toujours croissante, dans les grandes villes de la Grèce, de la mortalité due à la tuberculose. Ils sont dressés d'après les bulletins officiels du Ministère de l'Intérieur.

TABLEAU I.

MORTALITÉ DUE À LA TUBERCULOSE DES ORGANES RESPIRATOIRES ET AUTRES DANS NEUF VILLES DE LA GRÈCE PENDANT LES TROIS PÉRIODES QUINQUENNALES 1890–1894, 1895–1899, ET 1900–1904.

NOM DE LA VILLE.	MORTALITÉ PAR TUBERCULOSE DES ORGANES RESPIRATOIRES ET AUTRES.		
	I. Période quinquennale (de 1890 à 1894).	II. Période quinquennale (de 1895 à 1899).	III. Période quinquennale (de 1900 à 1904).
Athènes	2040	2461	3058
Patras	461	555	737
Corfou	189	217	588
Syra	534	557	575
Volo	131	196	272
Calamata	86	120	207
Larissa	106	83	209
Zante	60	122	199
Pyrgos	94	124	187
	3701	4435	6032

Note: Des douze villes sur lesquelles le bulletin du Ministère de l'Intérieur publie la statistique des décès on n'a pris en considération dans le tableau ci-dessus que neuf villes, car la statistique de la mortalité des trois autres villes (le Pirée, Trikkala, Tripolitza) étant sur quelques points imparfaite ne pourrait fournir de termes de comparaison à partir de 1890. Il faut savior que le Ministère de l'Intérieur ne publie que depuis 1899 un bulletin de statistique de la mortalité.

TABLEAU II.

MORTALITÉ DE LA TUBERCULOSE DES ORGANES RESPIRATOIRES ET AUTRES DE 1893 À 1907 DANS DIX VILLES DE LA GRÈCE D'APRÈS LES BULLETINS OFFICIELS DU MINISTÈRE DE L'INTERIEUR.

NOM DE LA VILLE.	POPULATION.		MORTALITÉ DE LA TUBERCULOSE DES ORGANES RESPIRATOIRES ET AUTRES.		
	D'après le Recensement de 1896.	D'après le Recensement de 1907.	I. Période quinquennale 1893 à 1897.	II. Période quinquennale 1898 à 1902.	III. Période quinquennale 1903 à 1907.
Athènes	122053	167479	2250	2896	3175
Le Pirée	51020	74580	797	968	1118
Patras	37985	37724	537	675	675
Corfou	29135	29032	195	435	587
Syra	18760	18132	535	585	540
Volo	16788	23563	168	244	301
Calamata	15956	15397	97	186	215
Larissa	15373	18001	68	168	238
Zante	14906	13580	71	194	157
Pyrgos	12708	13690	100	163	186
	334684	411178	4818	6514	7192

TABLEAU III.

MORTALITÉ DES MALADIES INFECTIEUSES ET DE LA TUBERCULOSE DES ORGANES RESPIRATOIRES ET AUTRES DE 1900 À 1907 DANS 12 VILLES DE LA GRÈCE.

NOM DE LA VILLE.	POPULATION.		MORTALITÉ DES MALADIES INFECTIEUSES DE 1900 À 1907.	MORTALITÉ DE LA TUBERCULOSE DES ORGANES RESPIRATOIRES DE 1900 À 1907.	MORTALITÉ DE LA TUBERCULOSE D'AUTRES ORGANES DE 1900 À 1907.	TOTAL DE LA MORTALITÉ DE LA TUBERCULOSE EN GÉNÉRAL DE 1900 À 1907.	MORTALITÉ DE DIFFÉRENTES MALADIES Y COMPRIS LA TUBERCULOSE DE 1900 À 1907.	SUR 100 DÉCÈS DE DIFFÉRENTES MALADIES SONT DUS À LA TUBERCULOSE.	TAUX ANNUEL DE LA TUBERCULOSE EN GÉNÉRAL PAR 10,000 HABITANTS.
	D'après le recensement de 1906.	D'après le recensement de 1907.*							
Athenes	122053	167479	3046	3682	1316	4998	28990	17,24	37,23
Le Pirée	51020	74580	1288	1284	655	1939	11447	16,94	32,50
Patras	37985	37724	1162	743	379	1122	7724	14,53	37,18
Corfou	29135	29032	445	702	229	931	5735	16,23	40,08
Syra	18760	18132	416	631	262	893	4831	18,48	61,56
Trikkala	21149	17809	685	292	97	389	3245	11,99	27,30
Volo	16788	23563	820	354	95	449	3993	11,24	23,85
Calamata	15956	15397	436	269	66	335	2690	12,45	27,28
Larissa	15373	18001	490	270	73	343	2811	12,20	23,83
Zante	14906	13580	266	213	71	284	2456	11,56	26,14
Pyrgos	12708	13690	549	196	100	296	2851	10,38	27,03
Tripolitza	10465	10789	246	94	37	131	1860	7,04	15,18
	366298	439776	9849	8730	3380	12110	78633	13,35	31,60

* Pour évaluer exactement l'augmentation de la population et par conséquent l'augmentation de la mortalité due à la tuberculose nous avons inscrit ci-dessus la population d'après les deux derniers recensements (1896 et 1907).

Des tableaux ci-dessus nous tirons les conclusions suivantes:

a. Que la mortalité due aux diverses formes de la tuberculose va constamment en croissant à partir de 1890 dans les grandes villes de la Grèce.

b. Que dans ces mêmes villes la mortalité due aux diverses formes de la tuberculose dépasse de beaucoup l'ensemble de la mortalité causée par toutes les autres maladies infectieuses.

c. Que le rapport entre la mortalité due à la tuberculose et la mortalité générale dans les grandes villes est de 15: 100 puisque sur 78,633 décès de diverses maladies y compris ceux dus à la tuberculose, il y a eu 12110 personnes qui ont succombé à cette seule maladie.

d. Que sur 10,000 habitants il y a en général 34 personnes par an qui meurent de la tuberculose.

Quant au rapport entre la mortalité générale et celle due à la tuberculose dans les diverses grandes villes il varie de 15 à 61 sur 10000 habitants.

e. Que sur 10,000 habitants meurent chaque année environ 25 personnes de tuberculose des voies respiratoires; et que selon le même rapport la tuberculose tue dans les autres villes de la Grèce plus de 9000 personnes par an en prenant en considération le recensement officiel de la population effectué en 1907 et d'après lequel la Grèce compte 2,631,952 habitants.

En se basant sur ce dernier recensement officiel (celui de 1907) on aurait tort d'attribuer l'augmentation de la mortalité due à la tuberculose à l'accroissement de la population vu que cet accroissement n'est pas considérable.

Dans une étude précédente on a fait savoir que la mortalité due à la tuberculose constatée dans l'armée hellénique est faible tandis que celle observée dans les asiles d'aliénés de la Grèce est supérieure à celle des asiles de France et que fort grande est aussi la morbidité et la mortalité dans les prisons helléniques.*

Par les faits exposés ci-dessus j'ai voulu fournir un tableau synoptique de la marche de la tuberculose en Grèce et montrer que les ravages causés par cette affection sont bien plus grands en Grèce qu'en Allemagne, Irlande, Suède et Suisse (20 sur 10000 habitants) ou en Angleterre, Belgique, Écosse, Hollande, Italie et Norvège (10 sur 10000 habitants)†, ou à New-York, Vienne et Paris.‡

II. Les causes sociales de la tuberculose en Grèce.

En Grèce on ne constate heureusement pas dans les classes pauvres le degré de misère et d'indigence observé dans les grandes villes populeuses des

* B. Patrikios: La Tuberculose en Grèce, Athènes 1903 pp. 45 et 69.
B. Patrikios: La marche de la tuberculose en Grèce, Athènes 1906 (texte grec) pp. 6–7.

† G. Daremberg: Les différentes formes cliniques et sociales de la tuberculose pulmonaire, Paris, 1905, p. 298.

‡ Armaingaud: Quelles sont les causes réelles de la décroissance progressive des décès, par tuberculose pulmonaire dans les vingt dernières années, à Berlin, Londres, New-York, Vienne et Paris? Académie de Médecine, séance du 7 Juillet, 1908.

autres Etats. Pourtant la propagation de la maladie en Grèce est due à une alimentation insuffisante dans les classes moyennes et surtout dans les classes inférieures, aux écoles construites contrairement à l'hygiène, aux bureaux publics malsains, aux établissements publics en général, aux hachoirs de tabacs, aux imprimeries, aux divers établissements industriels, aux prisons, aux mobilisations, à l'exode rural observé dans ces dernières années qui fait que les habitants des campagnes viennent s'établir dans les villes, à l'émigration pour l'Amérique, car nombre de ceux qui se sont expatriés reviennent tuberculeux et contaminent leurs familles qui jusqu'alors vivaient indemnes, et surtout au manque de mesures prophylactiques et à la non-désinfection des maisons où la maladie sévit.*

D'un autre côté la constante augmentation en Grèce de la syphilis toujours se propageant et de l'alcoolisme ainsi que l'insuffisance des mesures prises pour arrêter la propagation des maladies épidémiques qui prédisposent à la tuberculose telles la rougeole, l'influenza, la variole, la coqueluche, expliquent l'extension de la maladie.†

III. Fondation de la Ligue Panhellénique Antituberculeuse et début de la lutte contre la tuberculose en Grèce.—Initiative individuelle.—Sollicitude gouvernementale.—Législation hellénique.

Jusqu'en 1901 les ravages causés par la tuberculose n'avaient pas encore excité en Grèce l'attention du gouvernement et de l'opinion publique. La question fut mise à l'ordre du jour lors du Congrès Médical Panhellénique de 1901 à la suite des rapports lus et des communications faites. L'attention fut éveillée. Aussi dans l'intérêt du public et sur l'initiative de ce Congrès fut fondée la Ligue Panhellénique antituberculeuse. Cette association aussitôt formée considéra comme son premier devoir d'instruire le public de façon à le préparer à cette lutte, et procéda de suite à diverses publications qu'elle fit distribuer à plusieurs milliers d'exemplaires. Elle fit aussi des conférences populaires et s'occupa de créer en divers lieux des sous-comités.

En effet, ce fut ainsi qu'on éveilla l'attention et l'intérêt du public et qu'on lui fit connaître le danger qu'il courait à cause de cette maladie et par suite de sa propagation et il apprit que si la tuberculose est vraiment une maladie *transmissible* elle est évitable et curable. Une fois les préjugés populaires réellement extirpés la Ligue songea que la tuberculose en Grèce ne pouvait être combattue par les sanatoria pour des raisons purement économiques. Les sanatoria en Grèce ne peuvent servir que comme des établissements scolaires lesquels par leur action éducatrice et curative sont destinés à faire connaître la prophylaxie antituberculeuse.

* B. Zervéas: Compte-rendu au Congrès médical Panhellénique de 1901 (Texte grec), T. ii, p. 21.

† B. Patrikios: La tuberculose en Grèce, p. 73.

Plus de 10,000 tuberculeux auraient besoin en Grèce d'être recueillis et soignés dans les sanatoria. Sur ce nombre il y en a plus de deux mille qui sont privés de toutes ressources ou moyens d'existence et auraient besoin d'être admis gratuitement dans des sanatoria populaires, ce qui est impossible pour des raisons économiques, car pour les soigner il faudrait dépenser annuellement près de quatre millions de drachmes, et pour fonder de tels sanatoria populaires à leur usage il faudrait dépenser au moins huit millions de drachmes.

La Ligue tenant compte de tout cela, conseilla la fondation d'un pavillon spécial dans chacun des hôpitaux de l'État pour le traitement des tuberculeux selon les règles données aujourd'hui par la science moderne, en outre la création d'Établissements de désinfection dans les principales villes de la Grèce et jusqu'à ce jour elle a réussi partiellement, du moins sur ces deux points.

Mais la Ligue attribue une grande importance à la création de Dispensaires antituberculeux dans les grandes villes de l'Etat sur le modèle de ceux qui existent actuellement en France (à Lille, etc.), en Belgique, en Allemagne et ailleurs, d'autant plus qu'elle est d'avis que le Dispensaire fonctionnant comme établissement à la fois *social* et *médical* est plus en harmonie avec les coutumes, les habitudes et les préjugés du public et il est aujourd'hui le moyen le meilleur et le plus économique de lutter en Grèce contre la tuberculose. En se basant sur ces principes la Ligue a déjà fondé il y a deux ans un dispensaire antituberculeux à Athènes sur les bases du type Calmette, mais comme établissement social et médical tout en conseillant la fondation de dispensaires semblables dans les principales villes de la Grèce, ce qu'elle espère se fera bientôt.

En outre cette Ligue ne tardera pas à fonder un sanatorium sur une montagne élevée qui servira surtout d'école d'éducation antituberculeuse.

La Ligue dans son œuvre a été secondée par le gouvernement, qui est principalement intervenu comme auxiliaire moral, la recommandant et interprétant son but aux autorités et aux particuliers, et par la Croix Rouge Hellénique qui, suivant ses principes de haute philanthropie, est venue généreusement l'aider de ses deniers, luttant elle aussi avec la Ligue contre la tuberculose.

Quel a été le résultat de cette action de la Ligue?

Elle est parvenue à extirper des préjugés sociaux profondement enracinés dans le peuple, à éveiller l'attention et l'intérêt du public sur le danger qu'il court à cause de cette maladie et de son extension, à installer des Etablissements de désinfection non seulement à Athènes mais encore dans d'autres villes de la Grèce, à faire prendre soin des détenus dans les prisons atteints de tuberculose et de ceux qui sont soignés dans les hôpitaux généraux. En

outre les familles qui comptent dans leur sein des tuberculeux prennent maintenant des mesures prophylactiques et s'occupent de désinfection.

Ainsi quoique jusqu'à présent on ne soit point parvenu à obtenir une diminution des ravages causés par la tuberculose elle ne tardera pas tôt ou tard à être réalisée par la diffusion des principes de la Ligue et de l'influence qu'elle exerce sur la Société.

Depuis 1905 fonctionne sur l'initiative et le concours de dames philanthropes l'hôpital "Sotiria" fondé aux portes d'Athènes au pied de l'Hymette, dans lequel 40 lits ont été installés et où les tuberculeux sont soignés soit gratuitement soit contre rétribution alors que chez la plupart la maladie est dans un stade avancé.

C'est ainsi que la lutte antituberculeuse en Grèce a commencé et continue grâce à l'initiative privée aidée par la Croix Rouge Hellénique et par le gouvernement.

LÉGISLATION HELLÉNIQUE.

Le Décret Royal du 31 Décembre 1836 "Sur les soins à porter aux malades atteints de maladies contagieuses" ordonne ce qui suit pour ce qui est de la tuberculose pulmonaire.

"*Article* 47. La police dans le but d'empêcher la propagation de cette affection prend soin de ne pas laisser vendre ou faire usage par d'autres personnes tout ce qui a été employé par les personnes mortes de tuberculose: matelas, vêtements et linges, avant d'avoir été dûment aéré et lavé dans l'eau de chlore ou la lessive de cendres."

"*Article* 48. Les médecins eux aussi doivent attirer l'attention des parents du tuberculeux et de ceux qui l'entourent pour ce qui est de la propagation de la maladie, les empêchant même de se coucher sur le même matelas ou de séjourner dans la même chambre et généralement, de faire usage de ses vêtements, linges et vases."

Voilà donc *soixante douze ans* que la législation hellénique (dès 1836) déclare que la tuberculose pulmonaire est transmissible, ordonne des mesures prophylactiques et impose aux parents et aux médecins, sous peine d'emprisonnement de 1 à 6 semaines ou d'amende de 20 à 200 drachmes,* d'avoir à prendre des mesures de prophylaxie pour les personnes en bonne santé.

En outre la déclaration de la maladie après la mort de la personne atteinte de tuberculose est en Grèce obligatoire pour le médecin qui la soigne depuis la fondation du royaume hellénique.

Depuis lors la législation hellénique n'a pas été enrichie par de nouvelles dispositions spéciales relatives à la tuberculose.

Cette année la Chambre Hellénique a fait voter la loi "sur l'installation et le fonctionnement des Établissements de désinfection publics, communaux et

* Législation Hellénique. Code Pénal, article 572.

privés," et a en même temps ordonné la désinfection obligatoire en cas de maladies infectieuses et surtout contre la tuberculose.

Comme contribuant à renforcer efficacement la lutte contre la tuberculose en Grèce je considère les mesures que la Chambre Hellénique vient de faire voter* contre le paludisme, affection qui prédispose à la tuberculose ainsi que la lutte entreprise avec tant de chaleur en Grèce par la Société pour la limitation des affections paludéennes.

IV. Convocation d'un Congrès Hellénique contre la tuberculose en Grèce dans le but d'étudier des questions d'ordre local.

Bien des questions en rapport avec la tuberculose en Grèce, ont besoin d'une étude spéciale et de recherches particulières.

Telle est par exemple la question de la lutte contre la tuberculose dans les classes ouvrières, l'étude sur la réalisation possible ou non de la création de sociétés d'assurances contre la maladie pour les classes ouvrières, la prédisposition à la maladie ainsi que la morbidité par tuberculose chez les élèves (garçons et filles) des écoles tant publiques que privées, l'état de fréquence de la tuberculose en Grèce chez les prostituées et chez les émigrés hellènes à leur retour d'Amérique aussi bien que l'état de fréquence et le caractère de gravité de la tuberculose chez les vaches laitières en Grèce et chez les animaux domestiques, etc.

Dans le but d'étudier ces questions d'ordre purement local, sur l'initiative et sous les auspices de la Ligue Panhellénique contre la tuberculose vient d'être convoqué et se réunira à Athènes un Congrès hellénique contre la tuberculose au mois de mai 1909.

C'est de ce Congrès qu'on espère la solution de nombre de ces questions sinon de toutes.

Voilà comment se poursuit en Grèce la lutte contre la tuberculose.

Der Kampf gegen die Tuberkulose in Griechenland.—(Patrikios.)

I. Die Verbreitung der Tuberkulose in Griechenland von 1893 bis 1897 (inclusive).

II. Stiftung des Panhellenischen Bundes gegen die Tuberkulose (Ligue Panhellénique Antituberculeuse), und Anfang des Kampfes gegen die Tuberkulose in Griechenland.

III. Privat-Unternehmen.

IV. Staatliche Verhütungsmassregeln. Hellenische Gesetze.

V. Versammlung eines lokalen Congresses in Athen zur Verhütung der Tuberkulose und zum Studium von örtlichen Fragen.

* Loi sur la vente, contrôle etc. de la quinine du 13 février, 1908.

The Fight Against Tuberculosis in Greece.—(PATRIKIOS.)

I. The spread of tuberculosis in Greece from 1893 to 1897 (inclusive).

II. Founding of the Pan-Hellenic Antituberculous League, and beginning of the fight against tuberculosis in Greece.

III. Private initiative.

IV. Government preventive measures. Hellenic legislation.

V. Meeting of a local Congress in Athens for the prevention of tuberculosis and the study of local questions.

La Lucha contra la Tuberculosis en Grecia.—(PATRIKIOS.)

I. La propagación de la tuberculosis en Grecia de 1893 á 1897 (inclusivo).

II. Fundación de la Liga Anti-tuberculosa de Pan-Hellenic, y el principio de la lucha contra la tuberculosis.

III. Iniciativa privada.

IV. Medidas preventivas del Gobierno. Legislación Helénica.

V. Reunión de un Congreso Local en Atenas para la prevención de la tuberculosis y el estudio de las cuestiones locales.

THE TASK OF THE STATE IN THE ANTITUBERCULOSIS MOVEMENT.

By Hon. Governor Conrad Cedercrantz,
Kolmar, Sweden.

One of the first conditions of carrying the campaign against tuberculosis to a successful issue is, undoubtedly, the provision of a sufficient number of hospitals for the treatment of consumptives in an advanced stage of the disease, who constitute a source of constant danger of contagion to their surroundings. This is necessitated not only by compassion for these unfortunate fellow-beings, but also for the protection of those whom the consumptive exposes to the danger of contagion if he must spend the remainder of his life in his own or in other people's homes. Realizing this, in Sweden, where there has been a great lack of hospitals for consumptives, considerable effort has been made recently to bring about a better state of things.

With us, the usual rule is that expenses for the general administration of the department of health are defrayed by the community; but, in view of the great expense involved by a more general provision of tuberculosis hospitals, in the course of the work the opinion has grown stronger and stronger that, in some way or other, the State ought to coöperate and support the movement. Upon careful consideration of the matter it cannot be denied that the prevention of the spread of tuberculosis in the country is just as important a State economy as are many other enterprises, to the carrying out of which the State has engaged itself to contribute. The fact that tuberculosis is a universal danger seems to be a sufficient motive for the State to give its economic support in the struggle against the disease; in fact, to the consumptive's surroundings at home and at his work it is of such importance that, by practical treatment, the channels of infection be traced and destroyed and the knowledge of the character and the rational treatment of the disease be spread, that the economic coöperation of the State in arranging this matter seems to be fully justified.

Besides, it must not be overlooked that what is sacrificed to an energetic and practical fight against tuberculosis should not, from a wider political point of view, be considered as dead capital. Not only will those who have been restored to health by a rational treatment be saved to work for

the benefit of society, but it is of still greater importance that, by successfully preparing a methodical treatment for most consumptives, and by destroying the channels of infection, the disease may be expected in the future to be limited considerably in its extension.

There can, of course, be no reliable calculation made as to the value of the large labor supply which is, in this way, to be saved to society; but, surely, there is no exaggeration in assuming that the economic gain to society, through its outlay for the purpose in question, will fully counterbalance its expenses. In this respect it should not be forgotten that the evil in question makes the greatest ravages between the ages of twenty and sixty years. Of all the deaths between these ages in the towns of Sweden in the year 1904, about 36 per cent. were caused by tuberculosis, and of the deaths between the ages of twenty and forty years, this was the case with not less than 53 per cent.

Another argument in favor of State support of the antituberculosis movement may be mentioned here. It is greatly to the State's interest that the protective measures against the spread of the disease be carried out with a certain uniformity throughout the whole country. If this is not done, it might easily happen that communities that try, at great sacrifice of money, to limit the spread of contagion within their own boundaries, would never be able to reach this goal, for contagion would reach them through other communities that, for some reason or other, had not made arrangements for isolating their consumptives.

Even before the question arose of erecting more tuberculosis hospitals in Sweden, the State had given liberal support in the struggle against the disease. In 1897 a sum of about 2,200,000 Kroner (1 krone = $0.265), subscribed by the nation at large, was presented to King Oscar II. in honor of the twenty-fifth anniversary of his accession to the throne, and the King very generously devoted the amount to the cause of checking and curing tuberculosis. At the same time he expressed the desire that the money be used for erecting at least three public sanatoriums for the benefit of poor persons suffering from consumption of the lungs in its incipient stages, or who were not yet so ill that their condition could not be improved. It soon, however, became apparent that this sum—the so-called "Jubilee-Fund"—was not sufficient to build three sanatoriums, and that it would be necessary either to rest content with two, or to apply to the Riksdag (Diet) for a special appropriation for a third. The latter course was decided on, and in 1898 the Riksdag voted a large sum for the erection of the third sanatorium. The Riksdag also granted to all three sanatoriums free building-sites and wood for fuel.

While the work was in progress, a great advance in the price of labor and building materials occurred. For this and other reasons the bill of costs

proved to be considerably greater than had been estimated—so much greater, in fact, that the portion of the "Jubilee-Fund" that had been invested in the belief that the interest upon it would contribute largely to the maintenance of the institutions, had been very much reduced, and was by no means large enough now to render the future of the sanatoriums secure, more especially as the cost of maintenance was continually increasing. In 1904 the Riksdag generously voted the sum of 200,000 Kroner to be added to the "Jubilee-Fund" every year until it should be sufficiently large to provide security for the further maintenance of the sanatoriums. The Riksdag has, in addition, made an appropriation of 200,000 Kroner for the erection of the Crown-Princess Victoria's Sea Sanatorium for Scrofulous Children on the Skaldervik, and the last Riksdag has voted a sum of money for maintaining the Styrso Sea Sanatorium for Children.

But it was especially in connection with the plan of a more general provision of tuberculosis hospitals that the principle of the State's economic coöperation in the struggle against the disease proved to have aroused public opinion. At the proposal of the Swedish National Antituberculosis Association the Governor appointed a committee to investigate thoroughly the tuberculosis question, and to propose such measures as might be expected from the State. After having received the report of this committee and obtained the opinion of the authorities concerned, the Government placed a proposition before the Riksdag in April, 1908. On the 20th of May following the Riksdag passed a resolution to the effect that the State should contribute to the erection of sanatoriums and tuberculosis hospitals to the extent of half the actual cost of construction, with a maximum of 1000 Kroner (about $265) a bed, and that the Government should be authorized to give the necessary grounds belonging to the State, free of cost, to county councils, municipalities, parishes, associations, and private persons intending to erect such sanatoriums and hospitals. The Riksdag estimated that the total building appropriation during the next ten years would amount to 4,600,000 Kroner (about $1,219,920), and of this amount it assigned 400,000 Kroner for the year 1909.

In its proposition to the Riksdag the Government had expressed the opinion that the State ought also to contribute to the maintenance of the patients at these hospitals. This opinion was accepted by the Riksdag. With a contribution of 50 ore (about thirteen cents) a patient a day, the cost to the State for this purpose, during the period 1909–1918, was estimated at 6,442,250 Kroner. Thus the State should pay a cash amount of 11,042,250 Kroner (about $2,928,405) for the tuberculosis movement during the next ten years, besides giving the requisite ground in the possession of the Crown.

The importance of this resolution of the Riksdag cannot be overestimated. There is no doubt that the coöperation of the State in the form and to the

extent thus decided will be of the greatest value in carrying the fight against tuberculosis to a successful issue.

Soon after the Riksdag had passed the foregoing resolution, the second and last part of the report of the Government's committee appeared in print. In this the Committee, after thoroughly discussing the matter and giving an account of the legislation on tuberculosis abroad, proposes an entirely new antituberculosis act, some of the provisions of which I may mention here. For instance, it should be the duty of the medical attendant to report each death due to consumption that had come under his care, and instructions are proposed as to disinfection of the dwelling-place, personal clothing, and bed-clothing of the deceased. The local boards of health also should make the necessary arrangements to lessen the danger of infection where the consumptive lives under conditions that probably endanger the health of those around him. Further, it is proposed that the employment of consumptive persons in the dairy trade shall be prohibited, as also the employment of tuberculous women as wet-nurses.

As might be expected, the Committee has paid special attention to the question of protecting the coming generation from the danger of infection by tuberculosis. For instance, there should be a law dealing with the care of nurslings, to the effect that such children should not be reared in homes where tuberculosis exists. The Poor Law authorities, who bind out children, should exercise care that these children do not live under similar conditions. This should constitute an addition to the superintendence which, under the present law, the boards of health have to exercise with regard to nurslings.

The Committee has been fully alive to the importance of hygiene in the schools. Persons suffering from consumption in an infectious stage should not be allowed to serve as teachers. Before being appointed, the teacher must show a doctor's certificate. Should a teacher contract the disease after his appointment, he might be suspended from service and, if his condition does not improve within one year, he might be dismissed. Moreover, pupils duly declared to be suffering from infectious consumption should be liable to temporary suspension or to dismissal from the school. At the same time provision should be made that the pupil may get tuition. Detailed instructions also have been worked out regarding the cleaning and ventilation of primary schools and infant schools.

Finally, the Committee has had under consideration the relation between hygiene in dwelling-houses and in factories and the prevalence of tuberculosis. With regard to domestic hygiene, the Committee has proposed that it shall be the duty of the board of health to exercise control over the hygiene of private houses.

STATISTIK DER VOLKSSANATORIEN FÜR ERWACHSENE IN DER SCHWEIZ, UND GEGENWÄRTIGER STAND DER TUBERKULOSEBEKÄMPFUNG IN DER SCHWEIZ.

Dr. W. Kürsteiner,

Bern.

Im Auftrage des Schweizerischen Gesundheitsamtes (Direktor Dr. Schmid) erstattet.

Die nachfolgende tabellarische Zusammenstellung verzeichnet die Kurerfolge der letzten drei Jahre aus den sieben bestehenden schweizerischen Volkssanatorien. Die Kinderheilstätten von Heiligenschwendi, Wald, Leysin, und Langenbruck, mit insgesammt 120 Betten, sind, wie die Privatsanatorien, nicht miteinbezogen.

Die Zahl der Betten für Erwachsene beträgt auf Ende 1907, 530 (Heiligenschwendi 34, Leysin 120, Malvilliers 22, Basel-Davos 90, Wald 106, Braunwald 34, und Clairmont 62).

Nach der Höhenlage gruppirt steht Basel-Davos mit 1660m oben an und folgen alsdann die Sanatorien Clairmont mit 15500m, Leysin 1450m, Braunwald 1180m, Heiligenschwendi 1140m, Wald 907m, Malvilliers 800m.

Das Minimalkopfgeld pro Tag beträgt 1 Franken 50 centimes in Heiligenschwendi und Braunwald, 2 Franken in Davos und Leysin, 3 Franken in Clairmont.

Noch ist zu bemerken, dass zu den günstigen Resultaten betreffend die Arbeitsfähigkeit jeweilen auch die Lungenzustandsverbesserung, die Körpergewichtszunahme, die Hämoglobinsteigerung, die Lungen Kapazitäterhöhung, die Mischinfektionsbeseitigung und die Entfieberung hinzuzunehmen sind.

STATISTIK DER VOLKSSANATORIEN DER SCHWEIZ.*

		(Bern) Heiligenschwendi.			(Basel) Davos-Dorf.			(Zürich) Wald.			(Vaud) Leysin, S. Popul.			(Neuchâtel) Malvilliers.			(Genève) Clairmont S. Sierre.			(Glarus) Braunwald.		
		1905.	1906.	1907.	1905.	1906.	1907.	1905.	1906.	1907.	1905.	1906.	1907.	1905.	1906.	1907.	1905.	1906.	1907.	1905.	1906.	1907.
		Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.	Prozent.
I. Stadium.	Kurerfolg positiv	100.0	99.2	100.0	96.2	94.5	94.4	94.5	97.3	94.2	97.7	93.5	97.0	100.0	90.6	94.9	90.9	94.7	97.2	Angaben unerhältlich.	96.4	100.0
	Kurerfolg negativ	..	0.8	..	3.8	5.5	5.6	5.5	2.7	5.8	2.3	6.5	3.0	..	9.4	5.1	6.1	2.6	2.8		3.6	..
	Gestorben	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3.0	2.6	..		..	..
	Arbeitsfähigkeit voll	97.5	94.5	97.1	92.2	91.8	90.3	89.0	93.7	92.6	97.5	93.5	86.4	96.2	93.8	87.2	63.7	34.2	47.2		96.4	77 1
	Arbeitsfähigkeit wenig beeinträchtigt	2.5	4.7	2.9	2.5	2.7	6.9	6.4	3.6	5.8	2.5	6.5	12.1	..	3.1	12.8	30.3	57.9	44.4		..	22.9
	Arbeitsfähigkeit stark beeinträchtigt	..	0.8	..	1.3	5.5	2.8	4.6	2.7	1.6	..	..	1.5	3.8	3.1	..	3.0	5.3	8.4		3.6	..
II. Stadium.	Kurerfolg positiv	95.5	93.9	92.9	95.2	92.5	85.4	80.0	80.6	91.1	92.3	87.9	65.2	100.0	65.0	68.2	77.0	90.7	91 7		87.5	100.0
	Kurerfolg negativ	4.5	6.1	6.3	3.2	7.5	12.5	17.8	19.4	8.9	7.6	12.1	31.1	..	35.0	27.3	3.0	7.0	8.3		6.3	..
	Gestorben	..	..	0.8	1.6	..	2.1	2.2	..	..	..	..	3.7	..	..	4.5	..	2.3	..		6.3	..
	Arbeitsfähigkeit voll	70.0	72.5	76.2	87.3	88.7	85.4	64.4	61.3	80.0	92.4	85.7	28.1	..	30.0	27.3	26.5	23.3	16.7		25.0	44.4
	Arbeitsfähigkeit wenig beeinträchtigt	28.6	23.7	20.6	9.5	9,4	10.4	15.6	22.6	13.3	3.8	9.9	53.4	100.0	40.0	59.1	70.6	55.8	61.1	Angaben unerhältlich.	50.0	44.4
	Arbeitsfähigkeit stark beeinträchtigt	1.4	3.8	2.4	1.6	1.9	2.1	17.8	16.1	6.7	3.8	4.4	14.8	..	30.0	9.1	2.9	18.6	22.2		18.7	11.2
III. Stadium.	Kurerfolg positiv	59.4	66.3	65.8	81.5	77.1	78.4	63.6	66.3	67.7	55.1	45.8	31.1	..	13.3	20.0	58.4	70.6	100.0		48.6	60.6
	Kurerfolg negativ	40.6	33.7	32.9	13.9	15.7	14.8	34.8	32.6	28.1	41.1	48.2	57.8	100.0	86.7	80.0	33.3	17.6	..		45.7	36.4
	Gestorben	..	..	1.3	4.6	7.2	6.8	1.8	1.1	4.2	3.8	6.0	11.1	..	..	..	8.3	11.8	..		5.7	3.0
	Arbeitsfähigkeit voll	11.0	20.2	26.5	46.1	48.2	50.0	39.1	38.0	38.5	24.4	24.1	2.2	..	..	..	..	..	..		..	9.1
	Arbeitsfähigkeit wenig beeinträchtigt	60.3	51.5	47.1	30.8	24.1	27.0	23.6	32.6	38.3	25.6	28.9	33.3	33.3	13.3	40.0	62.5	35.9	18.7	Angaben unerhältlich.	11.4	33.3
	Arbeitsfähigkeit stark beeinträchtigt	28.7	28.3	25.1	18.5	20.5	16.2	35.5	28.4	26.0	46.2	41.0	53.4	66.7	86.7	60.0	29.2	82.3	81.3		82.9	54.6

* Fortsetzung der Statistiken von 1899, 1900, 1901 (Dr. Schmid, "Tuberculosis," 1903, S. 261); 1900 und 1901 (Prof. Egger, Zeitschrift für Tuberkulose und Heilstättenwesen, 1904, S. 173); 1902, 1903, und 1904 (Dr. Ost, Zeitschrift für Tuberkulose, 1906, S. 207); ohne Einschluss der Privatsanatorien und nur die Zahlen der Erwachsenen berücksichtigt.

ZUSAMMENFASSUNG DER ERFOLGE VON 1905–07.*

	Positiver Kur-erfolg.	Negativer Kur-erfolg.	Ge-storben.	Volle Arbeits-fähigkeit.†	Beein-trächtigte Arbeits-fähigkeit.	Aufgeho-bene Arbeits-fähigkeit.
I. Stadium.....	95.9%	3.6%	0.5%	84.4%	11.6%	3.5%
II. Stadium.....	81.5%	17.6%	0.9%	60.0%	30.3%	8.8%
III. Stadium.....	56.6%	39.7%	3.7%	19.5%	30.6%	46.2%
Total.....	78.0%	20.3%	0.7%	54.6%	24.1%	19.5%

Die Verteilung der Kranken auf die drei Turban'schen Stadien war für die drei grössten Volksheilstätten in den letzten drei Jahren folgende:

	Heiligenschwendi.			Basel-Davos.			Wald.		
	1905.	1906.	1907.*	1905.	1906.	1907.*	1905.	1906.	1907.*
I. Stadium.....	21	30	16	37	34	35	41	48	46
II. Stadium.....	40	31	41	29	23	26	17	13	17
III. Stadium.....	39	39	43	34	43	39	42	39	37

Dabei liefern die Männer die grosse Anzahl von Erkrankungen des III., die Frauen die grosse Anzahl des I. Stadiums.

Die mittlere Kurdauer der definitiv Aufgenommenen betrug in Tagen ausgedrückt:

In	1905.	1906.	1907.
Heiligenschwendi.....	88	9	88
Basel-Davos.....	156	151	163
Wald.....	129	132	139

* Da die Angaben für das Sanatorium Braunwald sich nur auf die Jahre 1906 und 1907 beziehen, ist diese Anstalt in dieser Zusammenfassung nicht berücksichtigt worden.

† Heilung im wirtschaftlichen Sinne haben demnach wie im Triannium 1899–1901 die Hälfte der Kranken zu verzeichnen, ¼ derselben ist für mehr oder weniger lange Zeit wieder arbeitsfähig geworden und nur ¼ hat die Erwerbsfähigkeit nicht wieder erlangt. Dabei sind in der Tabelle nur die definitiv aufgenommenen Kranken, die über 4 Wochen verpflegt wurden, berücksichtigt worden und 90% hatten beim Eintritt noch gearbeitet. Ungleiche Beurteilung des Kurerfolges und der Arbeitsfähigkeit, Verschiedenheit des statistischen Materials an und für sich (infolge grösserer oder geringerer Distanzen zwischen Sanatorium und Wohnort und damit zusammenhängenden Unterschieden in der Kurdauer) sind die Gründe der zum Teil recht bedeutend differierenden Ergebnisse der verschiedenen Stationen. Soviel aber ist aus den Tabellen deutlich ersichtlich, dass sowohl der klinische wie der wirtschaftliche Erfolg der Volksheilstättenbehandlung ein erfreulicher genannt werden darf; freilich sollten die Schwerkranken in stets zunehmender Zahl der Asyl-, Spital- oder Heimpflege überlassen und aus der Liste der Sanatoriumskuranten ausgemerzt werden können; leider aber fehlt es zur Zeit noch landauf landab sowohl an den Spitaleinrichtungen speziell für diese Kranken, als auch an der organisierten häuslichen Fürsorge.

Hinsichtlich der Dauer-Erfolge unserer Heilstätten ist auf die Dissertation von Dr. Walter, Bern, 1904, sowie auf die Jahresberichte der 3 ältesten Sanatorien Basel-Davos, Zürich-Wald, Bern-Heiligenschwendi zu verweisen, und seien hier nur die Schlusssätze zweier Zusammenstellungen wiedergegeben:

Basel-Davos, 1905, erwähnt nach 9 Jahren Statistik (*1*) eine bedeutend geringere Mortalität für die Davos-Patienten in den ersten Jahren als für die Basler Vergleichspersonen.

(*2*) Für die *nicht* in Davos Verpflegten eine bedeutend grössere Mortalität in den ersten Jahren, eine ungefähr gleichgrosse wie für die Davoser Patienten in den späteren Jahren.

(*3*) Eine durchschnittlich dreimal grössere Zahl von Erwerbsfähigen bei den Davoser Patienten als bei den nicht in Davos Behandelten.

Zürich-Wald, 1906, sagt wörtlich: Von den in den letzten 6 Jahren Entlassenen starben innerhalb der ersten 2 Jahre 25 Prozent; nur teilweise oder gar nicht arbeitsfähig waren bei der Entlassung nahezu 40 Prozent. Nach der Entlassung findet ein rasches Absterben jener Kranken statt, die durch die Anstaltsbehandlung ihre volle Leistungsfähigkeit nicht wieder erreicht haben; wesentlich günstiger werden die Aussichten für die Kranken, wenn 2–3 Jahre später die Arbeitsfähigkeit noch erhalten ist; die meisten dieser Glücklichen können dann als relativ geheilt betrachtet werden.

Während von den Leichterkranken bei der Entlassung die meisten 80% arbeitsfähig sind, so sinkt bei denen des II. Stadiums die Ziffer der arbeitsfähig Gewordenen ganz erheblich und es dürfte die Zahl der Relativgeheilten 40 Prozent nicht überschreiten; von den Schwerkranken sind höchstens 10 Prozent relative Heilungen anzusetzen.

Mit den Volkssanatorien hat die systematische Bekämpfung der Tuberkulose in der Schweiz eingesetzt (1905); ihnen folgten, ebenfalls der privaten Initiative entsprossen, die Fürsorgestellen (Dispensaires) und erst allmählig tauchen auch Tuberkulosegesetze und -Erlasse auf.* Die Schöpfung der Ferienkolonien† hat mit der Antituberkulose-Kampagne nur indirekten Zusammenhang.

Den Bericht des Schweizerischen Gesundheitsamtes an den Tuberkulose-Kongress von 1905 in Paris ergänzend, ergibt sich auf Juli, 1907, folgender Stand der Tuberkulosebekämpfung in der Schweiz:

Schweizerische Vereinigungen gegen Tuberkulose.—Die schweizerische Zentralkommission zur Bekämpfung der Tuberkulose (Präsident: Direktor Dr. Schmid) bildet das nationale Komitee der "Internationalen Vereini-

* Dr. Bollag, "Tuberkulosegesetzgebung in der Schweiz," Mitteilung an den Tuberkulose-Kongress in Washington, 1908.

† Im Berichte von 1905 des Schweizerischen Gesundheitsamtes (Dr. Carrière) an den Tuberkulose-Kongress in Paris, La Tuberculose et l'armement antituberculeux en Suisse, Berne, 1906.

gung" gegen Tuberkulose, in welche sie ein Ehrenmitglied und 2 Titular-Mitglieder entsendet, nebst einer Anzahl korrespondierender Mitglieder. Ihr umfangreiches Arbeitsprogramm dient den kantonalen und lokalen Vereinigungen gegen Tuberkulose als Wegleitung für deren Detailarbeit. Die Kreierung eines schweizerischen Tuberkulose-Museums in Verbindung mit dem Schweizerischen Gesundheitsamt steht bevor.

Die Hygiene-Kommission der schweizerischen gemeinnützigen Gesellschaft ist daran, die Enquête von 1905-06 über die Ursachen der Tuberkulose in der Schweiz zu bearbeiten.

Der schweizerische gemeinnützige Frauenverein hat im Februar 1905 eine besondere 7-gliedrige Zentrale Tuberkulose-Kommission eingesetzt und ist seit 1906 Kollektivmitglied der schweizerischen Zentral-Kommission zur Bekämpfung der Tuberkulose. 24 Sektionen beschäftigen sich mit der Tuberkulosebekämpfung durch Austeilen von Tuberkulose, Merkblättern, Abhaltung von Tuberkulosevorträgen, Abgabe von Milch, von Mittagessen, Beiträge an Sanatoriumskuren und Landaufenthalte, Wäschebesorgung, Wohnungsdesinfektion, Abgabe von Spucknäpfen, Krankenpflege u. s. w. Die Gründung von Frauenligen zur Bekämpfung der Tuberkulose in den Kantonen Solothurn, Neuenburg, Luzern, Freiburg, Waadt, ist hauptsächlich ihr Werk. Lausanne darf sich rühmen, die erste Sektion zu sein, welche ein kleines Asyl für tuberkulöse Kinder geschaffen hat; die Sektion Zürich hat die dortige Fürsorgestelle ins Leben gerufen.

Auch das schweizerische Rote Kreuz beschäftigt sich in einzelnen seiner Sektionen mit der Tuberkulose, indem es Vorträge über Tuberkulose ansetzt, Tuberkulose-Vereine subventioniert und Bildungskurse über Tuberkulose arrangiert, in deren Abendvorträgen die Bedeutung, Ursachen, Behandlung, Verhütung und Bekämpfung vorgeführt werden.

Tuberkulosebekämpfung in den Kantonen.—In den meisten Kantonen der Schweiz existieren heute Vereine, Kommissionen oder Ligen, die sich mit der Bekämpfung der Tuberkulose abgeben. Hier die Aufzeichnung derselben:

Appenzell a. Rh.: Tuberkulose-Kommission der kantonalen gemeinnützigen Gesellschaft.

Aargau: Sanatoriumskommission der kantonalen gemeinnützigen Gesellschaft; Tuberkulose-Kommission.

Basel-Stadt: Kommission für die Basler Heilstätte für Brustkranke in Davos—Basler Hülfsverein für Brustkranke—Kommission zur Fürsorge für Erholungsbedürftige; Kommission der Kinderheilstätten in Langenbruck.

Basel-Land: Kantonale Sanatoriumskommission der kantonalen gemeinnützigen Gesellschaft—Verband basellandschaftlicher Krankenkassen.

Bern: Verein der bernischen Heilstätte für Tuberkulose in Heiligenschwendi—kantonale Tuberkulosekommission der medizinisch-chirurgischen

Gesellschaft—Fürsorgeverein für tuberkulöse Kranke der Stadt Bern mit Fürsorgestelle—Tuberkulosekommission der Sektion Bern des schweizerischen gemeinnützigen Frauenvereins.

Freiburg: Ligue fribourgeoise contre la tuberculose mit Distriktkomitees, 2560 Mitglieder—Comité pour le placement de tuberculeux au sanatorium de Heiligenschwendi, à Morat.

Genf: Fondation du Sanatorium génevois—Société auxiliaire du Sanatorium génevois—Comité génevois des bains de mer (Hôpital maritime de l'Enfance à Cannes)—Dispensaire.

Glarus: Verwaltungskommission des Sanatoriums Braunwald der kantonalen gemeinnützigen Gesellschaft—kantonale glarnerische Kommission zur Bekämpfung der Tuberkulose.

Graubünden: Verein zur Bekämpfung der Tuberkulose und Errichtung einer bündnerischen Volksheilstätte für Lungenkranke—kantonale Tuberkulosekommission.

Luzern: Verein für ein luzernerisches Lungensanatorium, zugleich kantonale Tuberkulosekommission mit 2500 Mitgliedern—Frauenliga zur Bekämpfung der Tuberkulose.

Neuenburg: Ligue neuchâteloise contre la tuberculose mit Dispensaire—Comité du Sanatorium de Malvilliers.

Nidwalden: Kantonale Tuberkulose-Kommission.

Schaffhausen: Tuberkulose-Kommission der Sektion Schaffhausen des schweizerischen gemeinnützigen Frauenvereins.

Solothurn: Kommission der solothurnischen Heilstätte für Lungenkranke der kantonalen gemeinnützigen Gesellschaft—Solothurnische Frauenliga zur Bekämpfung der Tuberkulose mit über 6000 Mitgliedern.

St. Gallen: St. Gallische Sanatoriumskommission der kantonalen gemeinnützigen Gesellschaft—Tuberkulose-Kommission der Sektion St. Gallen des schweizerischen Frauenvereins.

Thurgau: Sanatoriumskommission der kantonalen gemeinnützigen Gesellschaft.

Tessin: Comités des bains de mer à Locarno, Lugano, Bellinzona und Mendrisio.

Uri: Hier hat die kantonale Sanitätskommission die Funktionen der kantonalen Tuberkulosekommission übernommen.

Waadt: Comité du Sanatorium populaire de Leysin—Ligue vaudoise contre la tuberculose—Dispensaire de la Policlinique de Lausanne—Dispensaire du Dr. Veillard (Source, école de gardesmalades) für unbemittelte Tuberkulöse.

Zug: Spezialkommission für den Bau einer Kinderheilstätte, der kantonalen gemeinnützigen Gesellschaft, zugleich zugerische Kommission für Bekämpfung der Tuberkulose.

Zürich: Aufsichtskommission der zürcherischen Heilstätte für Lungenkranke in Wald—Komitee für skrofulöse und rachitische Kinder in Zürich —Tuberkulosekommission der Sektion Zürich des schweizerischen gemeinnützigen Frauenvereins mit Fürsorgestelle—kantonale Tuberkulose-Kommission.

Volkssanatorien für Erwachsene.—Heiligenschwendi, bernische Volksheilstätte für Lungenkranke, auf 1149 m Höhe über Meer, mit 96 Betten.

Davos, in der Stille, Baslerheilstätte, auf 1660 m, mit 90 Betten.

Wald, Zürcherheilstätte, auf 907 m, mit 106 Betten.

Braunwald, Glarner-Heilstätte, auf 1180 m, mit 34 Betten.

Leysin, Waadtländische und interkantonale Volksheilstätte, auf 1200 m, mit 120 Betten.

Malvilliers, Neuenburgische Heilstätte, auf 860 m, mit 22 Betten.

Clairmont, Genferheilstätte, auf 1500 m, mit 62 Betten.

Es macht dies ein Total von 7 kantonalen Volksheilstätten mit zusammen 530 Betten aus; sie alle sind der Privatinitiative zu verdanken; die Beteiligung der Kantone beschränkt sich auf Subventionierung.

Im Entstehen begriffen sind: Ein solothurnisches Volkssanatorium (Allerheiligen), bezugsbereit auf Ende 1909;

ein *St. Gallisches* (Knoblisbühl am Wallenstadterberg), im Bau begriffen;

ein *Aargauisches* mit 327,000 Fr. Baufonds;

ein *Luzernerisches* mit 120,000 Fr. Baufonds;

ein *Freiburgisches,* in den "Sciernes d'Albeuve" geplant durch die Ligue antituberculeuse fribourgeoise;

ein Bündnerisches, in Arosa, in Sicht, mit 115,000 Fr. Baufonds;

ein *Neuenburgisches,* im Stadium begriffen (Sanatorium Malvilliers ist eine Gründung der Chocoladefabriken Russ-Suchard), und endlich ein *Thurgauisches* Volkssanatorium.

Noch ist zu erwähnen, dass verschiedene Kantone, die kein eigenes Sanatorium besitzen, Verträge mit bestehenden Heilstätten anderer Kantone abgeschlossen haben; so hat sich Solothurn 10 Betten in Heiligenschwendi, Basel-Land 10 Betten in Davos, Schaffhausen 5 Betten in Wald, Thurgau einige in Braunwald, Luzern 10 Betten im zukünftigen solothurnischen Allerheiligen, die Gemeinde Murton (Kt. Freiburg) 2 Betten in Heiligenschwendi gesichert.

Volkssanatorien für Kinder.—Das erste Kindersanatorium wurde 1902 in Leysin mit 35 Betten, das zweite, 1903, in Heiligenschwendi mit 42 Betten eröffnet.

Das Kinderhaus der Heilstätte Wald wird 1909 fertig sein und für ein Kinderpavillon in Braunwald besteht ein Baufonds von 18,000 Franken.

Erzenberg, das Kindersanatorium von Basel, in Langenbruck, mit

seinen 84 Betten, kann, wie wohl eigentlich Privatheilstätte, der niedrig gehaltenen Preise wegen, ganz wohl ein Kindersanatorium genannt werden.

Als letzte *direkte* Tuberkulosebekämpfungseinrichtungen für Kinder bleiben die "*cures de bains de mer*" der Kantone Genf und Tessin, die Kinderabteilungen des Armenbades Schinznach (Schwefelquelle) und des Sanatoriums Rheinfelden (Soolebad) zu erwähnen übrig.

Indirekten Kinderschutz gegen Tuberkulose bedeuten: alle unsere Ferienkolonien (gegen 40 an Zahl und für Aufnahme von gegen 5000 Kindern eingerichtet); die vielen Kinderheime für rachitische, skrofulöse, blutarme Kinder; die verschiedenenorts eingeführte Milchversorgung der Kinder in der Schule und während der Ferien die Milchküchen und Säuglingsheime von Genf, Zürich, Basel, Bern, Aarau, etc. Mit der Einrichtung von Waldschulen haben die Stadt Lausanne und die Gemeinde Hessigkofen den Anfang gemacht; Walderholungsstätten beabsichtigt Bern-Stadt in seinen prachtvollen, ganz nahen Wäldern einzurichten.

Sanatorien für Bemittelte.—Infolge seiner überaus günstigen klimatischen Verhältnisse sind einzelne auserlesene Höhenkurorte zu wahren internationalen Sammelpunkten der Tuberkulösen geworden; es befinden sich dieselben in weit beträchtlicheren Höhen über Meer als die Volkssanatorien, bei denen geschützte, sonnenreiche, nebelarme Lage, nicht allzugrosse Entfernung von zuhause, Keim- und Staubfreiheit der Luft die Hauptbedingungen ausmachen. Mehr denn 2000 Betten stehen den bemittelten Tuberkulösen in den Stationen Davos, Arosa, Leysin, Beatenberg, Weissenburg, Montana, Vermala, Ambri-Piotta, Piora zur Verfügung.

Tuberkulose-Fürsorgestellen, bezw. Dispensaires.—Seit dem letzten Berichte von 1905 des Hrn. Dr. Carrière sind als *neue* Schöpfungen gegen die Tuberkulose und in Ergänzung der Sanatorien für Leichterkranke, als Fürsorge speziell für die Schwerkranken, zu Hause zu Verpflegenden, aber auch als Auskunfts- und Untersuchungsstellen für alle übrigen unbemittelten Tuberkulösen die Fürsorgestellen bezw. Dispensaires antituberculeux ins Leben gerufen worden. Wir notieren zur Zeit folgende Stationen:

Die Fürsorgestelle für tuberkulöse Kranke der Stadt Bern als Zentralstelle des Tuberkulose-Fürsorgevereins, seit 1. Juni 1906;

die Fürsorgestelle für tuberkulöse Kranke der Stadt Zürich, der Sektion Zürich des schweizerischen gemeinnützigen Frauenvereins, im Mai 1908 eröffnet;

le dispensaire antituberculeux de Neuchâtel de la Ligue contre la Tuberculose dans le district de Neuchâtel, im Februar 1906 eröffnet;

le dispensaire antituberculeux de Genève, am 1. Mai 1906 eröffnet;

le dispensaire antituberculeux de la Policlinique universitaire seit 1. November 1907, et celui de la Source (Ecole de garde-malades) du Dr. Veillard à Lausanne.

Weitere "Fürsorgestellen" sind in Bildung begriffen: in Aarau, Biel-Schaffhausen, St. Gallen, Winterthur.

Die Antituberkulose-Bewegung in der Schweiz hat nach dem Gesagten in richtiger Weise den Sanatorien die Dispensaires folgen lassen und sollen sich diese zwei Einrichtungen nicht etwa gegenüberstehen, sondern kompletieren, in dem Sinne, dass die Sanatorien den initialen und leichtern Formen der Tuberkulose zur Heilung und Schulung, die Fürsorgestellen dagegen der häuslichen Fürsorge, besonders der schwerkranken Tuberkulösen, sowie ihrer Familien dienen sollen; dabei werden die Fürsorgestellen auch als zentrale Auskunfts- und Untersuchungsstellen für alle Formen der Tuberkulose funktionieren müssen, sich der Sputumuntersuchung annehmen und für richtige Desinfektion der Krankenräume, der Wäsche und Spucke sorgen.

An was es uns zur Zeit noch bedenklich gebricht, sind zwei Dinge: (1) vermehrte Gelegenheiten zur Unterbringung unserer schwerkranken Tuberkulösen; (2) durchgreifende Aufklärung und Belehrung unseres Volkes über das Wesen der Tuberkulose.

Der Staat als solcher hat sich bis zur Stunde noch nicht bemüssigt gefühlt, in den Kampf gegen die Tuberkulose einzugreifen; wenn auch das Schweizerische Gesundheitsamt die leitende Stellung in dieser Bewegung einnimmt, so sind es doch neben der schweizerischen Tuberkulosekommission vornehmlich die 15 kantonalen Tuberkulosekommissionen, die 7 kantonalen Lungenheilstätten, die 5 kantonalen Frauenligen, die 5 Dispensaires antituberculeux, die verschiedenen Sektionen der schweizerischen gemeinnützigen Gesellschaft und des schweizerischen gemeinnützigen Frauenvereins, die den Kampf gegen diese verheerende Volksseuche mit Wucht führen.

THE CAMPAIGN AGAINST TUBERCULOSIS IN THE ARGENTINE REPUBLIC.

By Emilio R. Coni, M.D.,
Buenos Aires.

History.

The first true practical measures of prevention against tuberculosis in the Argentine Republic were adopted in 1892. The director of the health department then ordered that tuberculous patients in the municipal hospitals should be concentrated in special wards of the isolation hospital (now Muniz) until a special establishment was constructed. In September of the same year an ordinance was issued prohibiting the admission of pulmonary tuberculosis to the common hospitals of the capital unless they were admitted to special wards. At the same time pulmonary tuberculosis was included in the group of affections where disinfection was obligatory in case of death, and only voluntary during the course of disease. It was then determined to erect a hospital devoted exclusively to tuberculosis, and in November, 1893, the malady was included among those which it was obligatory to note. Honor is due to the Argentine Republic for having been the first of Latin-American nations to incorporate in its sanitary legislation the effective resources of modern prevention; that is, compulsory notification and disinfection of tuberculosis. The honor is due Dr. Henry Tornú of having, in 1898, first traced in the Argentine Republic a general plan of prevention. His active propaganda in the press, his work on the climate of the hills of Cordoba, his popular review, "La Profilaxia," entitled him to public gratitude. The municipality of Buenos Aires, on its part, has satisfied its debt of gratitude, designating with his name the first municipal sanatorium; and the Argentine League, on its part, baptized its first dispensary, founded in 1902, with the name of this self-denying physician.

In July, 1899, Dr. Samuel Gache proposed to the "Argentine Medical Circle" the foundation of a league against tuberculosis. A short time after Dr. Robert Wernicke endeavored to pursue the same idea, but met with no success.

On May 11, 1901, in a small meeting of doctors, life was given to the Argentine League Against Tuberculosis, at a meeting called by me as presi-

dent of the International Committee for the Prevention of Tuberculosis in Latin America.

The Argentine League soon received the patronage of the Minister for Home Affairs, and one of his first suggestions was to organize branches in the various provinces of the republic. Unfortunately, this enterprise met with but little success, for up to now there are not more than two branches of the Central League, one in Rosario and another in Santa Fé.

The Argentine League commenced in 1910 its work of instruction in a popular way, publishing leaflets, pamphlets, and also a catechism on tuberculosis. On July 22, 1901, Dr. Samuel Gache, then president of the Argentine League Against Tuberculosis, gave the first conference to demonstrate the necessity of organizing an antituberculous defense, by means of popular leagues. After this conference eleven more followed, given by members of the League.

Later there were issued two wall engravings of great interest. The first relates to tuberculosis in general, to explain what the infirmity is, its causes, its prevention, and its treatment. The second graphically demonstrates the havoc which tuberculosis produces in comparison to other infectious diseases in the fourteen provinces of the Argentine Republic. Distributing them profusely and gratuitously in the schools, workshops, mills, barracks, post-offices, public administration offices, these engravings have served as a powerful auxiliary in spreading the ideas to prevent tuberculosis.

An ingenious method of propaganda was initiated by Dr. Tornú and realized by a powerful society—the General Match Manufacturing Co. It consisted in having printed on the match-boxes instructions relative to tuberculosis, in the form of short maxims. In the first year of its existence the League held two public meetings—one on the subject of spittoons, and the other to offer prizes to those who suggest easy and inexpensive methods for inculcating knowledge on tuberculosis. These meetings brought to light ingenious models of spittoons, and awoke private interest in the antituberculosis question.

The first number of the periodical belonging to the League saw the light in June, 1901, under the name "Revista de la Tuberculosis," which, a year afterward, was changed to the title of "La Lucha Antituberculosa." Last year it was changed again to "Alianza de Higiene Social." The periodical was distributed gratuitously to the adherents of the League, in the schools, libraries, mutual aid societies, hospitals, workhouses, and various asylums, and in the public buildings, etc.

In April, 1904, the Argentine League, by the presence of one of its prominent members in the Municipal Council, succeeded in getting an ordinance passed on the prevention of tuberculosis, which has been translated into various languages and has appeared in various periodicals. Recently the

Rivadavia Hospital (women). Tuberculosis pavilion.

Isolation Hospital (Muñiz). Consumptive patients' pavilion.

View of the sea-coast sanatorium.

League has had printed in leaflets popular instruction on tuberculosis, published by the German Imperial Sanitary Office, to the number of 100,000 examples.

As alcoholism is a powerful factor in the spread of tuberculosis, the League has carried on a great propaganda against alcohol, by leaflets, placards in public places, anti-alcoholic wall pictures in its dispensaries, and finally, at the beginning of 1907, presented to the National Congress a work on alcoholism in the republic, accompanying it with a bill for legislation on the matter.

Prevention in Infancy. Infants and Milk Dispensaries (Gouttes de lait). Creches. Infant Concourses (Baby Shows).

In 1891 the Municipal Intendency named a commission of doctors and statisticians, with the object of studying infantile mortality. The commission proposed the creation of a great institution with the name "Patronato de la Infancia," which occupies to-day first place in the country by its growth and great resources. This society founded in 1892 an infant and milk dispensary, such as came into existence many years later in France, under a different name. The origin of its creation then lies with the Argentine Republic. The "Patronato de la Infancia" has established free dispensaries for children's diseases, creches, a home for abandoned children of two to six years, a school for arts and artifices, and an agricultural industrial colony.

A daily paper of Buenos Aires, called the "Nacion," opened in 1905 a public subscription for the infants and milk dispensaries, which amounted to about 150,000 francs, and was given to the "Patronato de la Infancia." The "Public Assistance" created two milk dispensaries in the hospitals of "San Roque" and "Fernandez." The Municipal Council gave, in 1904, a subsidy of 1000 francs a month, to create an infant and milk dispensary for the purpose of supplying food to fifty children of the poor. This institution, created by Dr. Foster, is now permanent under the name of "Protection and Help to Infancy."

The League in February, 1907, submitted to the Municipal Council a bill which was accepted and is now in force. From this date all milk must be hygienized—that is, pasteurized, sterilized, maternalized, buddized, etc. Happily the laboratories in Buenos Aires are sufficient for the hygienization of about 350,000 liters daily.

The League has pointed out the benefits of scholastic canteens in the districts where the poorer classes predominate, remembering that many of the children have insufficient food. On the initiative of Dr. Genaro Sixto, medical inspector of schools, there has been established, in many of the public schools of the capital, the "cup of milk," similar to that which exists in

Switzerland, which may be considered as a forerunner of the scholastic canteen.

The Argentine League has also carried on propaganda for the holiday camps. One for 350 children of both sexes was founded in 1895 in Mar del Plata, by the National Council of Education, and one in 1902 by the Argentine League, under the title of the "Sommerpflege," for fifty children from seven to fourteen years, the offspring of tuberculous fathers who received assistance in the dispensaries. Lastly, a ladies' charity association has one holiday camp completed at the end of 1907.

In 1905 the Municipal Council, on the motion of Dr. Fernando Perez, sanctioned the creation of an agricultural colony with the name of Behring, and sufficient ground was acquired, but up to now nothing has come of it.

Commencing from January 1, 1903, the public service for disinfection carried the sanitary register of habitations. The number of sanitary files, corresponding one for each house, amounted to 16,328. Buenos Aires has nearly 100,000 houses, and yet only 16,328 are registered up to May 1, 1908. The municipal administration in 1907 began the construction of the workmen's houses in a great piece of ground ceded for that purpose by a generous philanthropist, utilizing the funds created by the ordinance of October, 1905. With the enlargement of the capital, its superficial area of 18,000 hectares, and its population of 1,150,000 inhabitants, and the facilities of locomotion given by its electric cars, many insalubrious houses have disappeared, and houses conforming to modern hygiene go on increasing in number, though there remains much to be done.

Street-cleaning. Hygiene of Public Premises.

The ordinance of April, 1902, forbade the sweeping of streets without previously sprinkling. To fulfil the same ordinance, there were fixed at street corners in the central parts of the city iron plates enameled with the superscription: "It is prohibited to spit on the sidewalks." Article 6 of the ordinance in question provides that: "In all houses and closed places frequented or inhabited by man; churches of whatever religion, schools and public and private colleges, hospitals, workhouses and asylums, barracks, workshops and mills, prisons, theaters, banks, hotels, furnished lodgings, cafés, apartments and blocks, halls and all places of business and public meetings, shall have spittoons on the floor or fixed in the wall, containing water or an antiseptic substance."

Obligatory Disinfection.

In September, 1892, there was passed a municipal ordinance to disinfect in all cases of contagious diseases, including pulmonary tuberculosis. The

Perspective view of the Doctor Rawson Dispensary.

public service of disinfection in Buenos Aires is very well organized. There are five disinfection stations and a personnel of 175 employees under the direction of a technical chief.

The notifications of pulmonary tuberculosis—that is, of invalids, deaths, or removal—are given by a very few doctors, by the Civil Registry, by the dispensaries of the Argentine League, and by two establishments—Isolation Hospital (Muniz) and the Dr. Tornú Municipal Sanatorium.

The statistics of the disinfecting service during the year 1907 give the following results: Deaths from pulmonary tuberculosis, 2115 persons, of whom 1149 died in the hospitals; that is to say, more than half of the tuberculous died in these establishments. The disinfecting service received 1764 declarations from various sources and intervened in 966 cases of death and 610 changes of domicile—a total of 1567 cases.

Hospitalizing and Isolation of the Pulmonary Tuberculous Patients.

Until the year 1891 patients affected with pulmonary tuberculosis were indiscriminately admitted to the common hospitals in Buenos Aires. The Directors of "Public Assistance" commenced, in the above-mentioned year, the provisional concentration of these invalids in the hospital for contagious diseases (Muniz). It is enough to record that 31 patients were assisted in 1891, while in 1905 the number had risen to 1126.

Of the 2115 deaths from pulmonary tuberculosis in the capital during the year 1907, 1149 of them were in the various hospitals, and two-thirds of these were in the Isolation Hospital.

Sea-coast Sanatoriums.

The "Revista de Higiene Infantil" made note of the absence of seaside sanatoriums for the treatment of weak, scrofulous children, predisposed to tuberculosis. "Sociedad de Beneficencia," in 1893, created in Mar del Plata, on the shores of the Atlantic Ocean, a seaside sanatorium, which has now capacity for 150 children of both sexes—the first created in Latin America.

Mortality from Tuberculosis in the Capital of the Republic.

In the ten years 1869–78 the death-rate from tuberculosis was 29.8 per 10,000 living; in the next ten, from 1879 to 1888, it was 26.3; from 1889 to 1898 it was 19.7; and from 1899 to 1907 it was 16.3.

The next table demonstrates the death-rate from tuberculosis during the last thirty years.

MORTALITY FROM TUBERCULOSIS IN THE FEDERAL CAPITAL DURING THIRTY YEARS (1878–1907).

Years.	Population.	Tuberculous Deaths.	Rate Per 10,000 Living.	Years.	Population.	Tuberculous Deaths.	Rate Per 10,000 Living.	Years.	Population.	Tuberculous Deaths.	Rate Per 10,000 Living.
1878	234,029	786	33.6	1888	455,167	1,098	24.1	1898	763,744	1,490	19.5
1879	257,440	804	31.2	1889	523,452	1,349	25.7	1899	795,323	1,675	21.1
1880	270,708	796	29.4	1890	547,144	1,255	22.9	1900	781,293	1,898	23.1
1881	289,925	805	28.0	1891	535,060	1,135	21.2	1901	848,367	1,893	22.3
1882	315,764	827	26.3	1892	554,713	1,181	21.3	1902	870,237	1,869	21.5
1883	340,375	953	28.0	1893	580,371	1,270	21.9	1903	895,381	1,919	21.4
1884	365,302	1,089	29.8	1894	603,012	1,419	23.5	1904	979,235	2,045	20.9
1885	384,492	1,042	27.1	1895	677,125	1,322	19.5	1905	1,025,653	2,145	20.8
1886	400,951	892	22.2	1896	721,095	1,368	19.2	1906	1,084,113	2,281	18.5
1887	437,875	1,066	24.4	1897	738,484	1,590	20.2	1907	1,129,286	2,394	19.2
Total		9,060	28.0	Total		12,987	21.9	Total		19,609	20.8

Examining the mortality from tuberculosis in the last ten years (1898–1907), we observe in those years very little difference, in fact, we might say that it is stationary, notwithstanding that Buenos Aires has reached a reduced general mortality (from 16 to 18 per thousand living). For complete success in the struggle against tuberculosis the improvement of the housing of the working-classes and of the sanitary conditions of theaters and churches, as well as of factories and shops; the multiplication of parks and playgrounds, gymnasiums, and baths; the widening of streets; the enforcement of a standard of healthful conditions in all occupations; the reduction of the working-day; the raising of wages; the education of women and girls of the tenements in the art of housekeeping and the science of food preparation; the crusade against the noxious features of the saloon; scientific instruction in the public schools on the evil effects of alcohol—all these tend to reduce the death-rate from tuberculosis.

The increased mortality from tuberculosis which occurred between 1869 and 1885 had already attracted the attention of the great Argentine hygienist, Dr. Rawson, who said in his memoir, presented in 1876, to the Medical Congress of Philadelphia, that Buenos Aires would see a diminution of mortality from tuberculosis, in consequence of the works of drainage and other hygienic improvements. The foresight of the wise hygienist has been vindicated. Tuberculous mortality has been diminishing in proportion as the general network of sewers and other works of drainage have been extended in the capital.

Front view of the Doctor Fernandez Dispensary.

Perspective view of the Doctor Tornú Dispensary.

The following table demonstrates the distribution of tuberculous mortality by sex and nationalities during a period of seven years (1901–1907):

Nationalities.	Male.	Female.	Total.	Rate of General Deaths, Per Cent.
Argentines	3,174	3,718	6,892	10.4
Italians	1,415	808	2,223	9.8
Spaniards	1,396	492	1,888	17.8
Uruguayans	271	240	511	24.9
French	323	154	477	9.8
English	50	27	77	7.6
Germans	41	27	68	10.8
Other nationalities	461	197	658	13.0
Totals	7,131	5,663	12,794	..

Attention is called in the preceding table to the numbers corresponding to the Spaniards and Uruguayans. The Argentine League, in its periodical, "Alianza de Hygiene Social," has revealed in various works that the Spanish race is specially predisposed to tuberculosis.

The following table reveals the distribution of mortality by sex in the Argentine and foreign colonies:

Years.	Argentines.		Foreigners.		Total.		General Total.
	Male.	Female.	Male.	Female.	Male.	Female.	
1901	429	451	534	261	963	712	1,675
1902	399	440	525	255	924	695	1 619
1903	384	507	520	278	904	785	1,689
1904	439	514	552	266	991	780	1,771
1905	476	602	549	287	1,025	889	1,914
1906	501	614	619	277	1,120	891	2,011
1907	546	590	658	321	1,204	911	2,115
Total	3,174	3,718	3,957	1,945	7,131	5,663	12,794

Studying the proportion of the sexes in the mortality from tuberculosis, we obtain the following results in the seven years 1901–1907:

		Died from Tuberculosis.	Per Cent.
Argentines	Men	3,174	24.8
	Women	3,718	29.1
		6,892	53.9
Foreigners	Men	3,957	30.9
	Women	1,945	15.2
		5,902	46.1

To better appreciate the above figures we give below the Argentine and foreign population, as recorded by the Municipal Census of 1904:

	Argentines.	Foreigners.	Total.
Minors of 15 years	303,690	28,939	332,629
From 16 to 50	201,354	306,524	507,878
From 51 years upward	17,997	92,387	110,384
	523,041	427,850	950,891

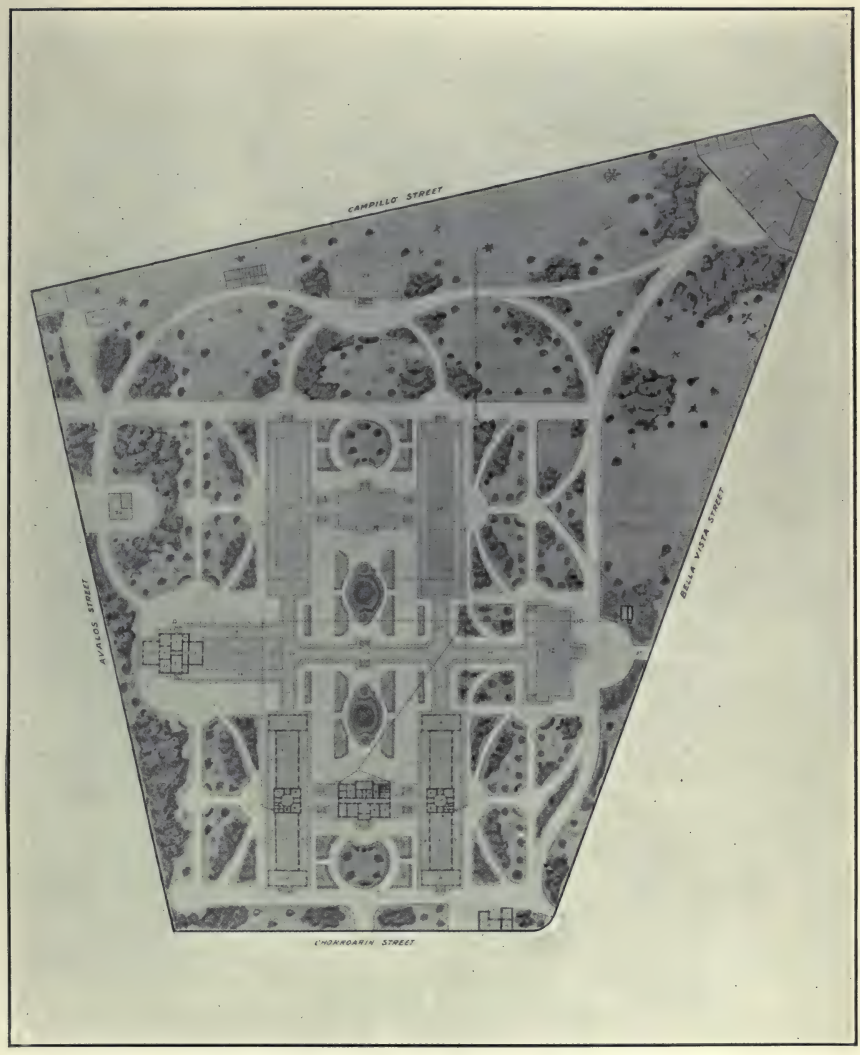
In the Argentines the tuberculous mortality of women is represented by 29.1 per cent., and only 24.8 per cent. in men. This difference is more apparent than real. The census of 1904 gave the Argentine population of fifteen to fifty years (the ages preferred for tuberculosis) 92,128 men and 109,227 women; that is to say, a preponderance of 17,099 women. Taking into consideration this discrepancy, it can be affirmed that tuberculous mortality is nearly equal in Argentine men and women. It is a fact that tuberculosis causes a greater mortality in men than in women (in general, about one-third more), because men, by their kind of work and habits of life, are more subject to the causes which produce tuberculosis.

For what reason, then, do the Argentines form an exception to the general rule? In Argentine men the use of alcohol favors in a high degree the spread of tuberculosis, but this cause cannot be taken into consideration when we treat of women of the same nationality. Of the women of Argentine nearly three-quarters more belong to the colored race, mixed races of Indian and white, or of white and negro—a condition very favorable for the disease. The Argentine colored women live under unfavorable conditions—bad food, bad houses, bad clothes, supporting a constant repetition of maternal duties; and if we add to these the circumstance of living in concubinage, there are found strong contrasting causes, which act on material naturally predisposed to phthisis.

The fact that the colored race is predisposed to tuberculosis has been clearly demonstrated by Dr. Azevedo Sodre in Brazil and by Mr. William H. Baldwin in the United States. Dr. Azevedo Sodre affirms that the statistics of mortality in Rio de Janeiro during the years 1903–1905 give the following results: Deaths from tuberculosis, 9560 persons, of whom 2277 were foreigners and 7283 national; of these, 3344 were white and 3929 of colored races; Africans not being included in this last number, but being considered as foreigners.

In Washington, from 7942 deaths from tuberculosis the statistics show in ten years (1897–1906) 3555 white and 4387 colored.

The death-rate from consumption under fifteen years of age, which is only 31.8 per 100,000 for the white population, is 246 for the colored—a rate con-



Plan of the Dr. Tornú Municipal Sanatorium.

siderably higher than is found at any age among the native-born whites of native parentage (Miss Lilian Brandt).

The tuberculous mortality classified by age gives the following table:

Age.	Argentines.		Foreigners.		Total.
	Male.	Female.	Male.	Female.	
Minors of one year	75	54	3	5	137
From 1 to 2 years	66	46	..	5	117
" 2 to 4 "	131	114	3	8	256
" 5 to 9 "	80	111	8	11	210
" 10 to 14 "	114	239	12	26	391
" 15 to 19 "	484	781	164	172	1,601
" 20 to 29 "	1,035	1,457	901	649	4,042
" 30 to 39 "	653	550	1,029	508	2,740
" 40 to 49 "	328	223	996	336	1,883
" 50 to 59 "	136	94	569	138	937
60 years and over	72	49	272	87	48
Total	3,174	3,718	3,957	1,945	12,794

Referring to age, this general rule is confirmed among us. In 12,794 deaths from pulmonary tuberculosis 10,266 are individuals of fifteen to fifty years of age.

Attention is called to the great difference in the Argentine male and female mortality, but the census of 1904 discloses a greater number of women than men, and for this reason the percentage of deaths is about the same.

It is to be observed also that in the ages between ten and thirty years the Argentine males figure with 1633 deaths, while the females have a mortality of 2477. This same fact has been put in evidence in New York by Miss Lilian Brandt in her work, "The Social Aspect of Tuberculosis, Based on a Study of Statistics."

In reference to the predominance of tuberculosis in the Spaniards, we record some statistical proofs. During the years 1901 to 1905 there entered the Muñiz Hospital 3125 tuberculous cases of both sexes. Of these, 1637 were Argentines, 562 Italians, 528 Spaniards, and 397 were of various nationalities. In the Dr. Tornú Municipal Sanatorium, from its foundation on March 12, 1905, to September 30, 1907, there entered 770 tuberculous men, among them being 331 Argentines. 192 Spaniards, 151 Italians, and 96 of divers nationalities. During the six years 1901 to 1906 there died in the federal capital, in consequence of tuberculosis, 6892 Argentines, or about 10.4 per cent. of the general mortality of the same nationality, 2223 Italians (9.8 per cent.), and 1888 Spaniards, or 17.3 per cent. To add still further proof to the high figure of tuberculosis corresponding to the Spanish race, we give in six years (1901–1906) the decease of 17,767 Italians, of whom 1883

were tuberculous, while the Spaniards, with a general mortality of 8785, had 1531 deaths from tuberculosis. If in the general mortality the Italian and Spanish colonies are represented proportionately to the respective population, it is not the same thing with tuberculosis.

The proportion of 17.8 per cent. of tubercular mortality corresponding to the Spaniards is only surpassed by the Uruguayans (24.9 per cent.).

This sensible difference, put in evidence between the Italian and Spanish colonies, the two most important races of our country, strikes one more forcibly having present the census of 1904, where the Italians figure with 228,556 inhabitants, while the Spaniards are only 105,206; that is to say, less than one-half of the Italians.

Dispensaries for Tuberculosis Patients.

One of the first objects which the Argentine League had in view was the creation of special dispensaries or clinics for the treatment of patients living at home (model Calmette-Malvoz). They projected also the creation of a popular sanatorium, soliciting for its construction the help of the State, by means of an animal lottery. But unfortunately the lottery authorized by the Congress gave only a net sum of $33,000. The funds were afterward used for the establishment of a model dispensary, which was inaugurated in September, 1903, and was named "Dr. Guillermo Rawson," in honor of the first Argentine hygienist. This dispensary served as an example for those which were created later in Rio de Janeiro and Montevideo. The League has two more dispensaries, "Dr. Tornú" and "Dr. Fernandez," and the three are situated among a large indigent population.

At the beginning of 1905 the municipality established the Dr. Tornú Municipal Sanatorium for men who have tuberculosis in its first stages, and it is inexplicable that they have not yet created a sanatorium for women and children.

The total number of beds for tuberculous cases in the three establishments (Muniz, Rivadavia, and the Dr. Tornú Municipal Sanatorium) is approximately 400—a number clearly insufficient for a population of 1,150,000 inhabitants. This explains why they still go on receiving pulmonary tuberculosis in some of the municipal hospitals, where there are no special facilities for caring for them.

Information Office for Tuberculosis.

At the beginning of 1907 the Argentine League organized an office of information for tuberculosis, with exactly the same purpose as that in Berlin directed by Dr. Kayserling. To this office go a great number of patients in search of assistance or simply for advice. According to their state or con-

Principal front, facing southeast.

Pavilion A.

Pavilion B.

dition, the patients are registered in the dispensaries of the League, or admitted to the Dr. Tornú Sanatorium if they are incipients, and to the Muniz or Rivadavia Hospital if they are found in a more or less advanced state.

The Doctor Tornú Municipal Sanatorium.

At the suggestion of the Argentine League, there was founded, at the end of 1904, by the then Director of Public Assistance, Dr. Edward Pena, the first popular sanatorium in Latin America. This sanatorium, under my direction, is situated in the high suburbs of Buenos Aires (Villa Ortuzar), and occupies a piece of ground in the form of an irregular polygon, surrounded by streets, and has an area of 72,000 square meters. It has accommodations for one hundred male patients. Its pavilions run from northwest to southeast. At each end there is a large hall (solarium), with ceiling of gypsum and sides of colored glass, and communicating with the wards and resting gallery. One of the halls serves as a dining-room and the other as a recreation-room. The two wards of the pavilion, containing twenty-four beds each, are united by covered corridors, having intersecting corridors leading to four separate rooms, viz., lavatory, bath-room, medical examination room, and attendants' room. The two pavilions are connected by means of a covered gallery with the administration building. In a pavilion separated from the rest of the building is to be found the culinary department and its appendages—distributing room, pantry, room for meat and vegetables, dining-rooms, etc. The patients' wards have been constructed on arches, one meter above the level of the ground, and the wards are surrounded by footpaths and ample gardens and parks. The ceilings of the wards have the form of an oval, with openings for the exit of air at the top and in the middle. The walls are coated with enamel up to two meters from the floor. The floors are of Venetian mosaic. The wide windows have bandrels at the top permitting easy ventilation.

The disinfection is done by steam under pressure (Fernand Dehaitre). Once a week it is operated for the disinfection of clothes, mattresses, bedlinen, underwear, elevated spittoons, etc. The monthly disinfection of the entire establishment is done by a gang sent by the public service.

Situated two leagues and a half from the capital, the Dr. Tornú Sanatorium has facilities of access by means of good paved roads and by electric trams to San Martin, the station being four squares (500 yards) from the establishment. The internal management has been copied from the more advanced European sanatoriums.

The assistance given by the Argentine League to the families of the patients in indigent circumstances permits them to have moral tranquillity, and also enables them to remain a sufficient time in the sanatorium.

The statistical results of the three years 1905 to 1907 demonstrate that incipient tubercular cases obtain a cure, or such a sensible improvement, that it permits them to regain what has been named the "economic capacity." Unfortunately the sanatorium is obliged to receive tuberculous patients in a period more or less advanced, sent by the "Public Assistance" when there are no beds free in the Muniz or Rivadavia Hospitals.

Animal Tuberculosis.

In October of the year 1900 the Argentine Republic passed its first law on animal sanitary police, and later introduced some modification. The Minister of Agriculture, in the Ganaderia department (cattle-breeding), has at his service 92 veterinarians and 150 special assistants. Imported oxen from abroad are put in quarantine for forty days, and animals imported from the provinces or neighboring countries for ten days. If no clinical tuberculous symptoms present themselves, they are submitted to a process of cutaneous-ophthalmo-dermo reactions.

SLAUGHTER-HOUSE OF LIGNIERES (FEDERAL CAPITAL).

Years.	Sacrificed.				Tuberculosis.					
					Steers.		Cows and Calves.		Pigs.	
	Pigs.	Steers.	Cows.	Calves.	Generalized.	Localized.	Generalized.	Localized.	Generalized.	Localized.
1898.....	36,128	308,622	128,032	100,251	343	333	298	312	..	1,160
1899.....	33,066	305,304	137,702	96,764	289	280	258	148	1,162	1,273
1900.....	37,824	321,068	131,443	63,023	423	257	364	155	959	2,420
1901.....	32,672	336,133	84,902	102,102	605	393	370	165	957	2,478
1902.....	38,185	287,378	109,432	97,459	475	149	384	70	1,133	2,992
1903.....	43,531	260,501	139,501	104,565	274	49	551	28	475	4,255
1904.....	41,577	274,745	126,107	92,249	267	80	416	63	375	3,881
1905.....	49,659	270,194	109,803	94,410	351	203	564	74	664	3,800
1906.....	54,524	264,731	120,437	107,731	300	537	521	203	563	2,563
1907.....	54,456	233,240	146,102	132,864	348	1,358	684	400	549	5,082
Totals	421,622	2,861,916	1,233,461	991,418	3,675	3,639	4,410	1,618	6,837	29,904

During the year 1907 there were imported from Europe 1799 bulls, of which 106 were sacrificed, having given reaction, disclosing tuberculosis at the autopsy. In 1906, 2753 bulls were imported, of which 227 were sacrificed, which is about 9 per cent. These reproducing animals have an individual value fluctuating between 1000 and 2000 national dollars.

In the interior of the country the official intervention depends on the common authorities. Thus, in all the capitals the milch-cows are tuberculinized. Animals are not admitted to the exhibitions from establishments where tuberculosis has been proved to exist.

In the slaughter-houses there is a service of veterinarians who do not permit the sale of animals attacked by generalized tuberculosis. That of the capital contains 21 veterinarians and 29 assistants, and a number of assistants for the investigations of trichina.

The proportion of tuberculosis in these special establishments was as follows in 1907:

	Slaughtered.	Tuberculous, Percentage.
Cold storage	553,673	1.010
Salting establishments	469,462	0.004

Tuberculization of Milking Cows.—The sanitary inspection of dairies in Buenos Aires has been in force many years, there being employed for this purpose six special veterinarians under the Sanitary Administration.

The official tuberculization of dairy cows was first established in 1896 in the city of Mendoza. A year afterward, in 1897, the sanitary authorities of the federal capital put in force a similar ordinance, making compulsory the tuberculization of the dairies of the capital. This example was imitated a short time after by the province of Buenos Aires, but unfortunately the measure was abolished, at the suggestion of the Argentine Rural Society. Until 1905 the "Public Assistance" consumed in its hospitals natural milk, and the first to employ pasteurized milk was the Dr. Tornú Municipal Sanatorium. Happily this practice has extended to all the municipal hospitals. Since the first of October, 1908, the hygienization of all milk consumed in the capital is obligatory.

In the dairies of the capital the statistics of tuberculosis for the last three years give the following results:

	Per Cent.
1905	18.81
1906	15.97
1907	17.00

Institute for the Observation of Milking Cows.—On the 12th of May, 1908, the Municipal Council sanctioned an ordinance for the foundation of an institute of observation for milch-cows, it being destined for the work of isolation, observation, and vaccination of these animals, with the purpose of proceeding with them in accordance with the laws now in force, if they be affected with tuberculosis or any other infectious disease, or immunized, if the proposed methods prove efficacious.

LA TUBERCULOSIS PULMONAR EN LAS CIUDADES DE GUAYAQUIL Y QUITO.

Dr. Carlo D. Saenz,

Professor en la Universidad Central, Quito.

La Tuberculosis, sobretodo la tuberculosis pulmonar, es frecuente en nuestras costas ecuatorianas y rara en las poblaciones interandinas; hecho que está en relación con la temperatura eugenésica óptima para la viabilidad del bacilo de la tuberculosis fuero del organismo (38°) y por tanto para la mayor facilidad de contaminación; y, en relación, también, con la diminución de microbios observada por muchos, en la admosfera de las grandes alturas y el aumento de glóbulos rojos en más de 500.000 por milímetro cúbico, para en eseas grandes altitudes, facilitando la oxigenación sanguínea, combatir la anoxiemia barométrica.

Tuberculosis en Guayaquil.

La hermosa ciudad de Guayaquil ocupa un plano horizontal de casi 2000 metros de ancho por 6000 más ó menos de longitud; al Norte limitan la ciudad unas pequeñas colinas que se dirigen de Este á Oeste; y hacia el Sur se extiende el mismo plano en un terreno cubierto de vegetación exuberante y algo más lejos de bosques intransitables de manglares; el río Guayas limita la ciudad al Este y el Estreo Salado al Oeste; Guayaquil está situado á los 82° 11′ 33″ Longitud 0. de París y á los 2° 12′ 0″ de Latitud Sur. El terreno sobre que descansa la ciudad es de formación marina, se eleva algo mas de un metro sobre el nivel del mar, y tanto por ser muy permeable, cuanto por estar casi rodeado de agua, esta se infiltra á tal extremo que en cualquier parte de la ciudad, basta cabar un metro de profundidad para que vierta el agua. La temperatura media de Guayaquil es de 27°5, siendo la máxima de 35° y la mínima de 18°. Los vientos dominantes tienen la dirección S. S. W. y S. S. E. en la estacion seca, y N. E. en parte de la estación lluviosa. La ciudad de Guayaquil, sinembargo, de tener un aire caliente y húmedo tiene buen clima y agradable, pues el aire fresco del mar y el que llega de las regiones andinas y la humedad de la admósfera, contribuyen poderosamente para que, especialmente en verano, jamás llegue el termómetro

á lo que debería llegar, en un pais casi situado en la línea equinoccial, y á poco menos de un metro sobre el nivel del mar.

La topografia de Guayaquil ha variado considerablemente de algunos años á esta fecha; pues, en parte por los grandes incendios que ha sufrido; y en otra por el adelanto progresivo natural de toda población, hoy la ciudad puede decirse redificada: posee calles muy anchas (20 metros) edificios espaciosos, bien airados y en toda la poblacion se observa bastante aseo, en una palabra, bastente higiene. La población de Guayaquil en el año de 1892, según el censo manifestado por el Dr. Holf, fué de 45000 habitantes; más el censo verificado en el año de 1899, fué, de 68,483.

La propagación de la tuberculosis en Guayaquil por el contagio también debe haber disminuido notablemente, pues hoy, el conocimiento de que es curable la enfermedad y de que es eminentemente contagiosa, está en al conciencia de toda persona en uso de razón, de modo que casi no hay individuo que no trate de cuidarse por medio del aseo y desinfección personal, que no trate de aislarse de los útiles &, &, de uso de sus enfermos y que no busque por cuantos medios de son permitidos y están á su alcance la manera de combatir su enfermedad, ya por la alimentación, ya por el cambio de clima, ya por el menor trabajo, ya por las prescripsiones medicamentosas.

Para el aislamiento de los tuberculosos existe en las afueras de la ciudad la casa de la "Convalecencia" edificio que funciona hace ya algunos años (desde 1902) con muy buen resultado, sinembargo el local es pequeño y por tanto insuficiente para el crecido número de enfermos existentes. Es indudable que tanto el Gobierno como el Municipio procupándose cual se debe de la necesidad que actualmente hay de separar los tuberculosos curables de los ya incurables y especialmente de aquellos que necesitan para su más pronta curación de un clima como el que nos ocupamos; digo, es indudable, que en breve se tratará de construir ya el Sanatorio Marítimo, ya el Dispensario antituberculoso que la situación exige.

Otro punto intimamente relacionado con la tuberculosis es el Alcoholismo y éste, á decir verdad, ha tomado gran incremento en el Litoral de nuestra República; crecidísimo es el número de cantinas, salones, clubs, &, &, en que se expenden licores de toda clase y condición, y habrá algo mas de experimentado y comprobado que el aumento considerable de tuberculosos debido al aumento de alcoholizados? No es para el trabajo compendiado de esta memoria el lugar de ocuparme en asunto tan suscintamente dilucidado por notables y muy ilustrados profesores; así, pues, no me detendré en disquisiciones acerca de cómo obra el *toxico alcohol* en los tejidos del organismo humano, para determinar la predisposición á la tuberculosis, ni tampoco cómo física y moralmente influye de manera eficaz el alcohol en la depauperación organica; nos limitaremos, pués, á decir que más que los trabajos corporales exagerados, más que el clima propio de esta ciudad tropical, es el alcohol

el factor principal en el acrecentamiento de la tuberculosis en Guayaquil; él el que da mayor número de predispuestos al contagio; porque Guayaquil es país laborioso, rico y muy filántropo y caritativo, allí nadie se muere de hambre, á ninguno le falta trabajo y trabajo bien remunerado; de manera que jamás se ven esos seres exaustos, demacrados, tísicos, en cuyos semblantes se pinta la necesidad con ojos escabados, de mirar suplicante; faz enjuta, pálida y terrosa: en una palabra esos seres que á diario se presentan en las grandes poblaciones, esqueletados casi sin vida; y, por fuerza, candidatos para toda clase de enfermedades y de crímenes.

En nuestra República está todo por hacerse respecto á lucha anti-alcoholica; no hay una sola liga contra el alcoholismo, no hay una reglamentación satisfactoria para la elaboración ni para el espendio de bebidas alcohólicas y fermentadas. Como medidas de represión nos contentamos con el hecho de que conste en nuestro Código Penal, la embriaguez, como contravención de 4*a* clase y multa de $8 á $20 y de tres á siete días de prisión, ó una de estas penas. El Gobierno debía establecer un impuesto á la elaboración tan fuerte que efectivamente contribuya para que el ébrio consuetudinario deje de serlo por imposibilidad pecuniariaó, en sentido opuesto, que los productores en vista de su pequeñísima utilidad, se dediquen á otro género de negocios más lucrativos. La prisión por embriaguez debia ser tal que en verdad corrija; y, en vez de siete días debia someterse al ébrio á una clausura de dos á seis meses. El número de cantinas & & donde se vende licores debía reglamentarse de manera que no pueda haber sino cierto número en relación con la densidad de la poblacion; pues mientra mayores facilidades existan para establecer ventas de licores, habrá mayor número de cantinas, mayor incitación y mayor número de ébrios; en Francia cuando el número de puestos de venta era limitado, hubo en el año de 1865: 351.048 tiendas de licores; en el año de 1875: 342.622; y derogada esa ley, hubo: en 1885, 399.145; en 1895: 424.575, y en el año de 1897: 425.507 cantinas & & ! Por último toca á nuestras autoridades, á nuestros Concejos escolares &, intervenir en la lucha contra la tuberculosis, de modo decisivo, por medio de conferencias, concejos, medidas higiénicas & contra el alcoholismo, factor principal de la tuberculosis en nuestro país.

Tanto en Guayaquil, como en todo el Litoral, la tuberculosis no respeta edad, sexo ni raza; pero sí conviene hacer presente que de modo general es en la raza indígena en la que se observa el mayor número tuberculosos; y, por lo que toca á la edad y al sexo, la enfermedad ataca, preferentemente, á los indivíduos relativamente jóvenes de 18 á 35 años y al sexo masculino.

Tuberculosis en Quito.

La Provincia de Pichincha se extiende en una superficie de 16, 106 Kl. cuadrados; limita al Norte. por la Provincia de Imbabura; al S. con la

de Leon; al E., con la Región Oriental; y, al O. con Esmeraldas y Manabí; su suelo es muy irregular y montañoso; tiene 48 parroquias que constituyen tres Cantones: el de Cayambe, al Norte; el de Quito, al Centro y el de Mejía, al Sur. Quito es la Cabecera del Cantón, la Capital de la Provincia y la Capital de la República: ciudad de segundo orden en América y de tercero en Europa; está situada en las faldas del Pichincha sobre una colina que da al Oriente y bajo la posición astrónómica de 0° 14′ 34″ de latitud Sur (Wolf) y en la longitud de 81° 4′ 38″ (Humboldt). Por el lado Sur, domina á Quito el cerrito de Panecillo, de forma cónica y que se eleva á 200 m. sobre la plaza mayor; y á 3121m. sobre el nivel del mar; además rodean á la ciudad las colinas de la Chilena, Ichimbia y Puengasí.

El suelo sobre que está edificada la ciudad es, como ya hemos dicho, muy irregular y para convencerse basta considerar que la altura en la parte occidental es de 2610m. sobre el nivel del mar; que la oriental es de 2923m. y que el la plaza mayor la elevación es de 2850m. (Wolf) (Lacondamine da para la plaza mayor 2865m.) que está en las faldas de una montaña y que atraviezan por su suelo dos profundas quebradas, de manera que fue necesaria la gigantesca obra de levantar dos series de arcos elevadísimos para sobre ellos edificar la ciudad; sinembargo las calles longitudinales son bastante planas. La Chorrera del Pichincha situada á bastante altura sobre la ciudad surte á ésta de buena agua potable y en suficiente cantidad, en nuestro concepto, pero por falta de algibes y de una instalación adecuada; es muy poca la cantidad de que durante el día aprovechan los pobladores y durante la noche toda se desperdicia, pues se vierte exclusivamente en las quebradas. Si se construyeran algibes grandes, para colectar en ello parte del agua ya mencionada, el aseo de la población sería muy fácil, pues con solo las dos grandes quebradas que atraviesan por la ciudad, sería muy fácil completar la canalización de esta y al dar salida al agua de los algibes, en gran masa, el aseo de la ciudad seriá completo, pues estará servida la población con el agua contenida en los otros algibes propios para ella y para la distribución á domicilio.

El sistema hidrográfico de Quito está formado por varios riachuelos venidos del Atacazo, los cuales, en la parte austral de Quito, en el plano de Turubamba, se reunen y constituyen el rio Machángara, éste pasa por las afueras de la ciudad y á su paso recibe el agua de algunas quebradás del Pichincha.

La pesión barométrica en Quito es de 547.00 milímetros, término medio del conjunto de las observaciones tomadas en el Observatorio de la Capital.

La diferencia de oscilación barométrica entre el máximo que corresponde á las 8 y 9 de la mañana, la oscilación media que corresponde á las 12 y 1 de la tarde, y la de la noche que es semejante, es sólo de menos de 4 milímetros, lo cual hace Quito goce de una presión barométrica muy poco variable.

El viento que sopla en Quito es por la mañana constantemente de Sur á Norte; y por la tarde con igual regularidad, de Norte á Sur. En tesis general puede decirse que el aire que se respira en Quito es por la mañana frío y seco, y por la tarde frió y algo húmedo.

Meses.	Año.		
	1878–1879.	1879–1880.	1880–1881.
	Cantidad de Lluvia.	Cantidad de Lluvia.	Cantidad de Lluvia.
Octubre	M. 0,1356	M. 0,0881	M. 0,0878
Noviembre	" 0,823	" 0,1349	" 0,0666
Diciembre	" 0,0538	" 0,0859	" 0,0984
Enero	" 0,0943	" 0,0694	" 0,0698
Febrero	" 0,0668	" 0,1195	" 0,0648
Marzo	" 0,0630	" 0,1512	" 0,1075
Abril	" 0,1945	" 0,1138	" ..
Mayo	" 0,1312	" 0,0975	" ..
Junio	" 0,0630	" 0,0198	" ..
Julio	" 0,0328	" 0,0066	" ..
Agosto	" 0,0460	" 0,0853	" ..
Setiembre	" 0,0470	" 0,0478	" ..
Suma	" 1,0103	" 1,0198	" 0,4949

Meses.	Año.					
	1878–1879.		1879–1880.		1880–1881.	
	Días de Llva.	Tempt.	Días de Llva.	Tempt.	Días de Llvo.	Tempt.
Octubre	11	8	18	16	19	16
Noviembre	5	5	17	9	10	8
Diciembre	6	5	16	7	21	14
Enero	18	10	11	8	12	7
Febrero	8	8	17	5	14	10
Marzo	17	4	23	14	11	3
Abril	28	21	22	17	..	..
Mayo	19	18	22	12	..	..
Junio	11	11	9	3	..	..
Julio	7	4	5	3	..	..
Agosto	8	3	14	10	..	..
Setiembre	9	4	10	4	..	..
Suma	147	111	184	108	87	58

Quito goza de dos estaciones: la de verano ó sea la estación seca, durante los meses de Junio hasta Noviembre; y la de invierno; la húmeda, desde Noviembre hasta Mayo, época esta última en la que con frecuencia caen fuertes tempestades de rayos y granizo, en la cual el ambiente se encuentra muy ozonizado. Sinembargo de que existe la estación, no por esto se crea que

rigurosamente dejande llover en Verano; pues en Quito se puede afirmar que no hay mes en el que no llueva algo.

He aquí resumen de la cantidad de lluvia en Quito, y por el cual se ve que no hay exageración al decir que en ningún mes deja de llover.

Por lo general las mañanas son hermosisimas, el cielo muy alegre y la admósfera pura y despejada completamente hasta las 12 ó 3 de la tarde, hora en que frecuentemente llueve, pero llueve á cantaros, de manera que las calles por la natural inclinación del terreno se convierten en correntosos ríos que arrastran á su paso cuanto encuentran, mäs esto dura poco, se restablece la calma y luego queda el piso seco, limpio, y biene á presentarse el hermosísimo cuadro de la puesta del sol tras las elevadas montañas de la Capital.

Fuera de lo dicho es necesario hacer presente que la ciudad de Quito se encuentra rodeada de bosques de Eucaliptus, bosque que, como alguien dijo, son los pulmones de las ciudades.

El calor propio del Globo Terrestre es producido por el equilibrio que existe entre el calor que envía el Sol, que es para la tierra de 1200 quintillones de calorías por año, más el calor de irradiación del centro de la Tierra que es de 1.36; y el frío interestelar que es de 100° á 120° bajo cero. Este calor propio del globo terrestre está repartido en proporción decreciente en tres zonas paralelas, y son: la Tórrida, comprendida entre los trópicos de Cáncer y de Capricornio; la templada, desde estos trópicos hasta los círculos polares; y, de estos círculos hasta los polos, la zona fría

El Ecuador, estando comprendido entre 2° de latidud Norte, y 6° de latitud Sur, está bajo la linea equinoccial, es un país tropical y por tanto corresponde á la zona tórrida; pero debido á las distintas alturas en las que se encuentran situadas sus principales ciudades, se halla en éstas los climas correspondientes á muy distintas zonas. Quito descansa sobre un subsuelo volcánico y seco, domina el valle de Chillo que está á 2500m. sobre el nivel del mar; el valle de Tumbado á 2390m. hacia el Norte de la llanura de Cotocollao á 2802m, y por la parte Austral, su meseta se continúa con el plano de Turubamba, que tiene la altura de 2900m., Quito es, pues, la más elevada de nuestras ciudades interandinas, y sinembargo, su temperatura media es sólo de 13.5° siendo de notarse que la temperatura media de Quito ha descendido durante el transcurso de algunos años, pues, Humboldt en el año de 1802 da para Quito la temperatura de 15°.6 (véase en la tabla isotérmica el número 384 de la obra Kleinnere Schriften de Humboldt) los Srs. Hall y Salaza, en los años de 1825á 1828, dan la temperatura de 15° 5; Bousingault, en 1831, señala la temperatura media de 15° 2; Salaza en 1831, durante los meses de Setiembre á Octubre, haciendo cuatro observaciones diarias, á obtenido la temperatura de 15°5, más los geólogos Reiss y Stubel, en los años de 1870 á 1874, dan la enorme diferencia de 2° 2; lo cual parece un hecho indudable, puesto que en el lapso de dos años, desde Octubre de 1878 hasta

Marzo de 1881, haciendo tres observaciones por día, el resultado de la temperatura media fue de 13° 5, como puede verse en el cuadro adjunto y temperatura que está en igualdad con la observada posteriormente, hasta hace poco por los Srs. Wickman y Gonnesiat:

TEMPERATURA DE QUITO.

Meses.	Años.		
	1878–1879.	1879–1880.	1880–1881.
	Término Medio Máximo y Mínimo Diario.	Término Medio Máximo y Mínimo Diario.	Término Medio Máximo y Mínimo Diario.
Octubre	14°.03	13°.47	13°.18
Noviembre	13°.86	13°.80	13°.61
Diciembre	13°.44	14°.19	13°.43
Enero	13°.19	15°.10	13°.38
Febrero	13°.60	13°.74	12°.61
Marzo	12°.83	13°.94	13°.47
Abril	12°.84	14°.00	....
Mayo	14°.13	14°.55	....
Junio	13°.79	14°.46	....
Julio	13°.02	14°.51	....
Agosto	13°.91	13°.20	....
Setiembre	13°.74	13°.79	....
Término medio anual	13°.53	13°.07	13°.26

Termino medio general.....13°.5

TEMPERATURA DE QUITO.

Meses.	Años.		
	1878–1879.	1879–1880.	1880–1881.
	Término Medio de Tres Obs. al Día.	Término Medio de Tres Obs. al Día.	Término Medio de Tres Obs al Día.
Octubre	13°.88	12°.65	12°.79
Noviembre	13°.80	13°.23	13°.42
Diciembre	14°.12	13°.44	13°.28
Enero	15°.10	14°.37	13°.40
Febrero	13°.89	14°.14	13°.08
Marzo	12°.86	13°.90	13°.66
Abril	12°.92	13°.41	....
Mayo	13°.46	13°.71	....
Junio	12°.68	13°.82	....
Julio	12°.46	13°.54	....
Agosto	13°.18	13°.03	....
Setiembre	13°.05	13°.22	....
Término medio anual	13°.19	13°.63	13°.27

Termino medio general.....13°.5

La temperatura de Quito corresponde en la clasificación climatérica de M. Levi á un clima templado, en la de Rochard, también á un clima templado y en la clasificación mèdica á un clima exitante y tónic.

Otro de los factores cuyo estudio es indispensable al tratar del clima de una ciudad en relación con la tuberculosis, es el aire que se respira, sus condiciones de mayor ó menor pureza y su composición quimica.

Quito no tiene en sus immediaciones ninguna localidad en que se produzcan miasmas capaces de envenenar el aire de la ciudad; Quito debido á la natural inclinación irregular del terreno sobre que está edificada la ciudad, es impropio, para que se estanquen y corrompan las aguas lluvias, sin que por esto se desconozca que la falta de abundante y buena distribucion de agua potable á domicilio, sea motivo para que el desague de las casas sea imperfecto. En cuanto á la densidad de la población en la ciudad de Quito está en perfecta harmonía el número de sus habitantes con el área edificada; sus pobladores viven muy holgadamente, lo cual es muy natural puesto que sus casas, por lo general, son de sólo dos pisos, grandes con habitaciones espaciosas, extensos patios y muchas con huerto. Quito posee todas sus calles bien empedradas; asi, pues, no se puede decir que existe ese polvo, en verdad muy nocivo, que circula en las ciudades que carecen de empedrado. En Quito, por desgracia para las industrias, hay carencia exesiva de establecimientos fabriles, y las pocas fábricas que existen están situadas en las afueras de la población; y, por lo que toca á los vientos, ya lo indicamos en otro lu gar.

De todos los elementos que constituyen el aire que respiramos, es al oxígeno el elemento indispensable para la vida y, luego, la carencia de microorganismos, de gérmenes patógenos; estos microbios, es natural asegurar, que en la admósfera de la población de Quito, se encuentran en muy escaso número; pues un hecho por demás probado es el de que á mayor altura, menor número de microbios exista, razón por la que los lugares montañosos, de granaltura, tienen mucha ventaja y superioridad en cuanto á clima y curabilidad de ciertas dolencias sobre las localidades bajas y sobre todo populosas; sería largo enumerar aquí lo mucho que se ha escrito al respecto, baste con manifestar que el Sr. Miquel en el aire de la calle de Rivoli, en París, encontró la cantidad de 55.000 bacterias por metro cúbico; en Thouneá, 560 m. 600 bacterias; y sobre 2000, 0; Freudenreich á 2100 metros no encontró ningún esquizomiceto; por último Jean Binot, en el agua del Monte Blanco, á 2500 metros de altura, encontró 8 bacterias por centímetro cúbica; y, en el agua del Sena: 4,325,000, por centímetro cúbico.

Ahor, pues, por deduccion se debe colegir que el aire y el agua de la ciudad de Quito tiene que ser relativamente muy pura, toda vez que esta población se halla situada á 2850 mt. sobre el nivel del mar.

Aún no se ha practicado un análisis circunstanciado de la composición química del aire de la ciudad y de las cercanías de Quito, más, también se

debe deducir, por analogía, que los elementos secundarios se encontrarán en la correspondiente proporciön; así, pues, se encontrarán el ácido carbónico, el argón, el vapor de agua, los carbidos de hidrógeno, los nitratos y nitritos &, &, solo sí que el ozono con frecuencia se verá aumentado por ser, tambien, frecuentes las tempestades en esta región andina; y, por lo que hace á la proporción de oxígeno, éste, indudablemente será de 21,4, toda vez que ésta es la proporción dad por el análisis del profesor Caillete, quien para sus análisis tomó el aire con un globo sonda á la altura de 15,500 mt. Se dira que el aire que introducimos en nuestros pulmones en la ciudad de Quito tiene menor cantidad de oxígeno por causa de su mayor rarificación? y que la sangre ha perdido parte de su poder de fijación del oxígeno por causa de la falta de presión atmosférica? Cierto que así debe pasar, pero también se debe tener en cuenta que la Naturaleza, previsora cual ninguna otra para la conservación de los seres vivientes, ha hecho que los fenómenos de la respiración pulmonar y los de ventilación sean en estas alturas mucho más rápidos, hasta la aclimatación del individuo, es decir hasta que el número total de los glóbulos rojos, se encuentre debidamente aumentado, á fin de que no se presenten los fenómenos propios de la anoxemia barométrica; aqui los experimentos de los Srs. Egger y Mercier, quienes han comprobado que la sangre aumenta en sus glóbulos rojos de 1.500,000 transcurridos siete meses de vivir á la altura de 1,882 mt. y todavía más, las observaciones del profesor Viault, que puso de manifiesto que el número de glóbulos rojos de la sangre tenía un aumento de 500.000 por míl. cúbica en el hombre que vive á la altura de 2,850 mt. en el Pic du Midi, es decir, á una altura igual á la de Quito, de donde resulta que el habitante de esta Capital, comparado con el habitante de nuestras costas, tiene, por lo menos, 5,000.000.000.000. de aumento de glóbulos rojos y por tanto, en la función de la oxigenación, compensa la falta de presión, el enrarecimiento del aire y la menor aptitud para la fijación del oxígeno.

Por todo lo que llevamos expuesto, creemos que, cualquiera que se detenga en leer lo hasta aqui manifestado, podrá darse cuenta cabal de la bondad del clima de Quito y de los buenos resultados que aquí puede obtenerse en la curación de la tuberculosis pulmonar; buenos resultados que los veremos cunplidos poco despúes que se encuentre en servicio público la monumental obra fundada por la Sociedad de Beneficiencia Olmedo, el Sanatorio Rocafuerte, y obra de la que luego nos ocuparemos más detenidamente; para terminar cual se debe con lo relacionado acerca del clima de Quito, reproduciremos las palabras del Sr. Orton, quien tratando del Ecuador, en su obra "Andes y Amazonas" dice: "El viajero se encanta al ver aquellas praderas que se dilatan en las costas y, sobre todo, al ver aquella alfombra de perpetua verdura en que reposa Quito, alfombra más hermosa talvez que la de los ondeantes jardines de Babilonia. El clima es sumamente delicioso, y la hermosa Italia, con todos los hechizos de su cielo, queda muy atrás. Si los antíguos hubieran conocido estos valles de la cordillera andina, habrían

colocado en ellos los Campos Elíseos y el resueño asiento de la vida larga, feliz y bendecida, soñada por Anacreonte.

No se crea que por lo que llevamos dicho, suponemos que en Quito no existe la tuberculosis, nó; las estadísticas de hace treinta años nos manifiestan lo contrario, pero sí nos prueban con toda evidencia, que la tuberculosis, especialmente, la pulmonar, ha tomado gran incremente, sobre todo en estos últimos años, cosa explicable desde el momento que, hace muy poco se toman medidas profilacticas, que hace poco se propaga la idea de contagio, que el contagio por las relaciones con tuberculosos venidos de las costas tienen que haber aumentado en relación directa con el aumento de indivíduos enfermos que á diario viene en busca de mejor clima dadas las mayores facilidades que, por ventura, hoy existen para la traslación; y que por último, debido á un grave descuido, la declaración obligatoria de la tuberculosis y la consiguiente desinfección, &, &, existen como ley desde hace muy poco tiempo pero ley que en verdad aún no se lleva á efecto.

La estadística de la tuberculosis que presentamos á continuación, es tomada de la única fuente posible en esta ciudad, des Hospital, siendo de notarse que ella solo pueda datar del año 1871, época en la que por vez primera, con la venida de las Hermanas de la Caridad, se comenzo á llevar y compilar los libros estadísticos correspondientes á los enfermos que ingresaban y á sus respectivas dolencias; también conviene advertir, que aún estos datos son deficientes respecto á la tuberculosis, pues los diagnósticos inscritos, casi siempre, por los Srs. estudiantes, señalan con el nombre de "*afección pulmonar*," casos de tuberculosis que hoy tienen que figurar como casos dudosos; además, siendo como es frecuente el hecho de presentarse en el decurso de una tuberculosis, una pneumonía una bronquitis ó una grippe, también añadimos la estadistica correspondiente á estas enfermedades; hela aquí:

PERÍODÍ DE DIEZ AÑOS (DE 1871 AL 1880), SEGÚN EL SEXO.

Años.	Tuberculosis.			Bronquitis.			Pneumonia.			Grippe.	Total de Hsp.
	H.	M.	†	H.	M.	†	H.	M.	†		
1871	10	6	1	89	19	2	45	18	3	39	2.042
1872	8	3	1	118	8	5	48	19	3	10	2.549
1873	17	2	8	96	5	3	62	19	7	15	2.466
1874	13	4	7	78	23	6	72	33	13	21	2.570
1875	13	6	8	81	26	12	46	26	23	22	2.492
1876	19	4	5	73	16	6	44	33	20	45	2.177
1877	16	5	5	158	18	8	61	33	17	26	3.442
1878	19	9	7	184	29	8	66	30	21	29	3.723
1879	22	14	4	216	20	9	43	26	13	43	3.603
1880	28	6	8	222	39	27	61	25	20	38	3.803
Total	165	59	54	1315	203	86	548	262	140	288	28.927
Total general	224			1518			810			288	3840

PERÍODO DE 10 AÑOS (1871 Á 1880), SEGÚN EL ESTADO.

Años.	Tuberculosis.			Bronquitis.			Pneumonia.		
	Soltero.	Casado.	Viudo.	Soltero.	Casado.	Viudo.	Soltero.	Casado.	Viudo.
1871	10	5	1	64	32	12	39	21	3
1872	7	2	2	77	42	7	29	33	5
1873	10	6	3	57	40	4	35	38	8
1874	9	7	1	46	43	12	48	44	13
1875	13	5	1	46	38	23	25	35	12
1876	10	9	4	44	37	8	27	37	13
1877	10	8	3	99	72	5	44	43	7
1878	14	12	2	108	101	4	46	46	4
1879	20	15	1	116	105	15	31	33	5
1880	13	18	3	122	114	25	37	35	14
Total	116	87	21	779	624	115	361	365	84
Total general	224			1,518			810		

PERÍODO DE 10 AÑOS (1871 Á 1880), SEGÚN LAS RAZAS.

Años.	Tuberculosis.				Bronquitis.				Pneumonia.			
	Blan.	Neg.	Ind.	Mez.	Blan.	Neg.	Ind,	Mez.	Blan.	Neg.	Ind.	Mez.
1871	4	..	..	12	39	7	9	53	14	1	7	41
1872	4	1	..	6	34	7	8	77	24	1	6	36
1873	6	4	3	6	32	9	7	53	26	3	13	39
1874	6	1	2	8	34	4	9	54	31	6	11	57
1875	11	2	1	5	44	6	12	45	26	6	8	32
1876	5	3	3	12	28	5	8	48	27	2	8	40
1877	5	2	1	13	33	9	1	133	19	4	2	69
1878	6	1	2	19	37	8	7	161	19	3	10	64
1879	7	2	7	20	75	12	4	145	17	5	7	40
1880	5	2	5	22	79	4	17	161	18	1	18	49
Total	59	18	24	123	435	71	82	930	221	32	90	467
Total general	224				1,518				810			

PERÍODO DE 10 AÑOS (1871 Á 1880), SEGÚN LAS EDADES.

Edades.	Tuberculosis.	Bronquitis.	Pneumonia.
De 0 á 9 años	2	14	13
" 10 á 19 "	18	235	100
" 20 á 29 "	77	663	242
" 30 á 39 "	60	266	172
" 40 á 49 "	30	118	120
" 50 á 59 "	18	77	66
" 60 á 69 "	13	87	57
" 70 á 79 "	5	50	31
" 80 á 89 "	0	7	7
" 90 á más	1	1	2
Total	224	1518	810

PÉRÍODO DE 10 AÑOS (1881 Á 1890), SEGÚN EL SEXE.

Años.	Tuberculosis.			Bronquitis.			Pneumonía.			Grippe.	Total de Hosp.
	H.	M.	†	H.	M.	†	H.	M.	†		
1881	27	6	7	153	36	19	61	37	21	18	3.316
1882	24	5	5	269	45	38	85	68	58	90	3.549
1883	29	5	12	126	60	19	59	32	26	52	2.906
1884	36	9	10	133	54	29	68	37	32	46	3.210
1885	42	18	14	107	30	14	69	27	25	31	3.571
1886	31	9	13	118	37	11	55	26	16	23	3.272
1887	28	12	6	123	40	15	71	31	22	75	3.437
1888	38	10	11	116	32	19	62	34	24	78	3.809
1889	37	20	17	158	32	21	81	53	40	179	4.265
1890	45	19	12	180	38	22	82	28	24	365	4.265
Total	337	113	107	1483	404	207	693	373	288	957	36.163
Total grl.	450			1,887			1,066			957	36,163

PERÍODO DE 10 AÑOS (1881 Á 1890), SEGÚN EL ESTADO.

Años.	Tuberculosis.			Bronquitis.			Pneumonia.		
	Soltero.	Casado.	Viudo.	Soltero.	Casado.	Viudo.	Soltero.	Casado.	Viudo.
1881	6	26	1	79	96	14	37	46	15
1882	10	18	1	118	166	30	50	77	26
1883	10	22	2	65	85	36	29	44	18
1884	16	25	4	68	80	39	39	50	16
1885	25	32	3	63	49	25	31	44	21
1886	20	15	5	68	71	16	25	40	16
1887	17	18	5	63	74	26	29	49	24
1888	18	25	5	66	55	27	24	50	22
1889	23	27	7	104	65	21	58	52	24
1890	27	32	5	95	87	36	38	57	15
Total	172	240	38	789	828	270	360	509	197
Total general	450			1,887			1,066		

PERÍODO DE 10 AÑOS (1881 Á 1890), SEGÚN LAS RAZAS.

Años.	Tuberculosis.				Bronquitis.				Pneumonia.			
	Blan.	Neg.	Ind.	Mez.	Blan.	Neg.	Ind.	Mez.	Blan.	Neg.	Ind.	Mez.
1881	9	6	1	17	53	3	18	115	19	1	20	58
1882	8	0	4	17	97	5	37	175	35	3	26	89
1883	7	5	4	18	46	2	18	120	23	1	18	49
1884	10	0	5	30	37	0	14	136	15	3	15	72
1885	13	6	8	33	39	6	18	74	16	4	20	56
1886	10	0	5	25	24	6	12	113	14	2	11	54
1887	14	0	7	19	30	3	10	120	17	1	17	67
1888	10	1	3	34	18	8	12	110	5	0	11	80
1889	9	1	1	46	36	7	0	147	12	1	1	120
1890	10	0	1	53	59	8	0	151	13	3	1	93
Total	100	19	39	292	439	48	139	1261	169	19	140	738
Total general	450				1,887				1,066			

PERÍODO DE 10 AÑOS (1881 Á 1890), SEGÚN LAS EDADES.

Edades.	Tuberculosis.	Bronquitis.	Pneumonia.
De 0 á 9 años	11	49	14
" 10 á 19 "	34	211	97
" 20 á 29 "	132	524	238
" 30 á 39 "	136	402	260
" 40 á 49 "	77	238	194
" 50 á 59 "	28	136	106
" 60 á 69 "	22	184	98
" 70 á 79 "	7	100	31
" 80 á 89 "	3	34	26
" 90 á más	0	9	2
Total	450	1,887	1,066

PERÍODO DE 10 AÑOS (1891 Á 1900), SEGÚN EL SEXO.

Años.	Tuberculosis.			Bronquitis.			Pneumonía.			Grippe.	Total de Hosp.
	H.	M.	†	H.	M.	†	H.	M.	†		
1891	43	13	8	118	28	9	89	36	32	110	3.840
1892	56	15	22	128	20	13	65	32	22	355	3.726
1893	74	30	22	85	23	8	72	55	23	360	4.266
1894	75	37	20	103	17	8	73	34	9	269	4.258
1895	75	45	16	126	18	11	177	52	32	488	5.402
1896	58	16	10	90	16	8	89	50	25	204	4.185
1897	34	14	8	19	15	6	40	26	12	83	2.572
1898	55	17	19	59	12	7	84	26	12	181	3.016
1899	84	24	8	34	19	1	142	37	10	248	3.140
1900	75	13	5	29	20	7	219	39	16	567	3.993
Total general	853			979			1,437			567	3,993

PERÍODO DE 10 AÑOS (1891 Á 1900), SEGÚN EL ESTADO.

Años.	Tuberculosis.			Bronquitis.			Pneumonia.		
	Soltero.	Casado.	Viudo.	Soltero.	Casado.	Viudo.	Soltero.	Casado.	Viudo.
1891	24	27	5	61	70	15	31	77	17
1892	34	30	7	62	60	26	29	54	14
1893	40	50	14	43	53	12	46	66	15
1894	52	51	9	55	46	19	45	48	14
1895	65	43	12	71	61	12	114	78	37
1896	34	32	8	63	33	10	65	55	19
1897	13	30	5	17	13	4	21	36	9
1898	26	37	9	38	30	3	45	46	19
1899	73	30	5	22	23	8	109	60	10
1900	56	25	7	27	15	7	186	51	21
Total	417	355	81	459	404	116	691	571	175
Total general	853			979			1,437		

PERÍODO DE 10 AÑOS (1891 Á 1900), SEGÚN LAS RAZAS.

Años.	Tuberculosis.				Bronquitis.				Pneumonia.			
	Blan.	Neg.	Ind.	Mez.	Blan.	Neg.	Ind.	Mez.	Blan.	Neg.	Ind.	Mez.
1891	6	4	0	46	24	6	0	116	22	3	6	94
1892	7	3	0	61	27	10	1	110	10	0	0	87
1893	14	0	0	90	13	1	1	93	10	1	1	115
1894	10	2	2	98	24	1	0	95	12	1	1	93
1895	8	6	1	105	20	5	5	114	17	15	12	185
1896	12	9	9	44	11	10	7	78	9	4	17	109
1897	7	0	5	36	0	2	8	24	3	0	15	48
1898	2	1	1	68	4	2	0	65	2	1	6	101
1899	3	0	0	105	1	0	0	52	2	2	1	174
1900	3	0	1	84	1	0	1	47	4	2	0	252
Total	72	25	19	737	125	37	23	194	91	29	59	1258
Total general	853				979				1,437			

PERÍODO DE 10 AÑOS (1891 Á 1900), SEGÚN LAS EDADES.

Edades.	Tuberculosis.	Bronquitis.	Pneumonia.
De 0 á 9 años	11	48	27
" 10 á 19 "	97	93	123
" 20 á 29 "	244	271	442
" 30 á 39 "	215	202	352
" 40 á 49 "	116	114	231
" 50 á 59 "	98	83	136
" 60 á 69 "	28	103	73
" 70 á 79 "	22	48	28
" 80 á 89 "	17	14	21
" 90 á más	5	3	4
Total	853	979	1,437

Por los datos estadísticos que acabamos de exponer se puede juzgar muy fácilmente acerca de la enorme diferencia que existe entre los ingresos habidos por tuberculosis en nuestro Hospital, desde el año de 1871 al de 1901, es decir, en el período de treinta años, siendo relativamente pequeña la diferencia en cuanto al ingreso total anual; es, pues, alarmante la propagación que la tuberculosis ha tomado en la Capital de la República, y más alarmante, aún, es el número de enfermos atacados en la edad mas varonil, de los veite á lao cuarenta años de edad; y, consiguiente número de defunciones.

Si además tomamos en consideración los casos que se han observado de enfermos de Bronquitis, Pneumonía y Grippe, en relación con la predisposición que ellas dejan para con la tuberculosis; y, además el crecido número de indivíduos que han sido atacados de esas enfermedades en relación con las demás afecciones tratadas en el Hospital, tendremos mayor motivo para inquietarnos, respecto al desarrollo ulterior de la tuberculosis. He aquí

porque es de indispensable necesidad la pronta terminacion del Sanatorio Rocafuerte, del asilo y curación de nuestros tuberculosos, de su hospitalización para evitar el contagio, &, &.

La Sociedad de Beneficencia "Olmedo," establecida solemnemente en Quito, el día 28 de Mayo de 1893, por los costeños residentes en la Capital, concibió la idea de fundar un Sanatorio para Tuberculosos y el día 1° de Mayo de 1900, el Presidente de la Sociedad Sr. Dr. Juan Francisco Game, colocó la primera piedra fundamental de lo que doy llamamos "Sanatorio Rocafuerte," de la monumental obra que está próxima á terminarse y para la cual han prestado su apoyo todos los Gobiernos y de modo especial los del Sr. Dr. Luis Cordero, y el Sr. General D. Eloy Alfaro, quienes de modo especial favorecieron la obra del Sanatorio creando fondos especiales para dichos trabajos.

El Sanatorio Rocafuerte está situado en las faldas del Pichincha tras la loma llamada de San Juan, que lo separa del centro de la población siendo dicha loma, la terminación hacia el Norte de la Colina denominada "La Chilena;" El "Sanatorio Rocafuerte" dista del centro de la ciudad más de 1000 metros; está situado de manera que recibe el sol de Oriente, á la altura de 3000 mtr., sobre el nivel del mar; y 150 mtr, sobre la plaza principal, en lugar casi despoblado y con una vista panóramica extensa y hermosísima; el aire que allí se respira es de lo más puro, sin polvo y sin gérmenes nocivos; el sitio fué elegido previo el informe de una comisión técnica compuesta de los Srs. Drs. en Medicina, Dn Ricardo Ortiz y Dn Manuel M. Casáres, y de los Ingenieros Srs. Dn. Gualberte Perez y Dn Francisco Schmidt.

Tanto para la formación del Plano cuanto para la distribución de las localidades para aparatos, aireación, &, &, reglamentos, &, &, se han tomado informes precisos y se han practicado estudios prolijos ya por personas competentes de la localidad, ya por comisiones enviadas á personas idóneas del Exterior. En suma la Sociedad de Beneficencia Olmedo, á la que me onro perteneciendo como su Socio Fundador, ha procedido en todos sus actos observando el mayor acierto que le ha sido posible.

El edificio principal tiene la forma de semicírculo del cual parten 10 radios que constituyen diez pabellones, cada uno de estos tiene 24 mtr. de longitud y 9 mtr. de latitud; entre uno y otro hay un extenso jardín y la curva total es de 160 mtr. de longitud; el semicírculo se cierra por un edificio de dos pisos, con una extención de 132 mtr.; en la parte central y posterior están dispuestos los locales para Capilla, Maquinarias, Lavanderías, &, &, y cada Pabellón está arreglado con capacidad suficiente para 24 camas.

Todo el edificio es construido de cal y piedra, y cal y ladrillo y los techos de fierro galvanizado; todo irá pintado al óleo y arreglado de conformidad con las reglas científicas respecto á higiene, acepcia, anticépcia, &, &. Además, fuera de las 240 camas para enfermos en el edificio principal, se construirán

El Sanatorio Rocafuerte.

otros edificios secundarios para pencionistas y para los Tuberculosos que padezcán de otras enfermedades también contagiosa.

El Sanatorio Rocafuerte es de los de tipo costoso, su valor acenderá, más ó menos, á $500.000, razón por la que se lo ha calificado de Monstruo, de Sobérbia y Magestuosa Montaña de Granito, &, y en verdad que si es Soberbio y Magestuoso; pertenece al tipo de los Sanatorios de Alemania, Inglaterra y Estados Unidos, como el Falkenstein, el Brehmer, el Hohenhonnef, el Ventnor, el Brompton, el The Home de Denver, el de l'Etat de Massachusetts, &, &. La Sociedad Olmedo para adoptar ese tipo costoso, quiso hacer una obra duradera, una obra que desafíe al tiempo, una obra espléndida y'completa; y entre innumerables datos, se tuvo en cuenta los suministrados por el Sr. Dr. Roberto Cucalón que en ese entonces residía en Berlín y concurrió al Congreso Médico que tuvo lugar en esa Ciudad: así también se tomó en consideración los informes emitidos por el Sr. Dr. Dn. Carlos Mateus, que por comisión de la Sociedad, se puso al habla al respecto, en Nueva York, con los Srs, Professores Drs. Henna y Birmingham, el primero miembro del Directorio de un Hospital para enfermedades del pecho, y, el segundo, Médico especialista en afecciones pulmonares.

Para mejor conocimiento adjuntamos el Plano del piso bajo y las fotografías de la parte anterior y superior del edificio; advirtiéndose, que en mucho se ha modificado y agrandado el plano de la parte posterior.

Ahora, veamos otro punto muy importante en relación con nuestros tuberculosos; es la mayor ó menor facilidad que tenga un Tuberculoso para trasladarse á estas regiones Andinas dado el estado en el que se encuentre su dolencia, las condiciones que requiere su venida de la Costa á la Capital, y no digo de la Capital á la Costa, porque si bien es verdad que en, muchos casos se presenta la indicación especial del clima de la Costa para la curación de aquellos tuberculosos hemoptoicos, cardiacos, &, también, es cierto que por falta en esas localidades de Dispensarios, de Sanatorios, &, &. no es posible enviar á los enfermos pobres en buzca de climas costaneros.

Hasta hace pocos años, puede decirse que sólo hemos tenido una via de comunicación entre Quito y la Costa, la via de Babahoyo que requería un equipo de viaje muy considerable, pues este se hacia á caballo, por caminos exesivamente quebrados, y á traves de lugares despoblados y faltos de todo género de lo que pudiera necesitarse aun gozando de cómpleta salud. Hoy ha llegado para el Ecuador la época de verdadero progreso y de civilización; hoy tenemos en servicio una linea ferrea que uni la Capital de la República, Quito, con nuestro puerto principal, con Guayaquil; hoy, porque no decirlo, debido al empuje que en estos últimos tiempos le ha dado el Gobierno del Sr. Grl. Eloy Alfaro, á la suspirada obra del ferrocarril del Sur, se encuentra terminada y en servicio; hoy somos felises y nos veremos prósperos; pero, tratándose de los Tuberculosos que vengan á buzcar el alivio de sus dolencias

en el benéfico clima de la Sierra, se podrá decir que han ganado con la obra del ferrocarril, con las comodidades que éste presta para el viaje, y con la rapidéz en el traslado? Claro está que sí; pero siempre que el traslado se lleve á efecto observando escrupulosamente las prescrípciones que un facultativo entendido les suministre al emprender su viaje, porque no podrá un Tuberculoso inpunemente, subir en ferrocarril, en seis ó siete horas, una altura de 10626 pies sobre el nivel del mar, descansar una noche á 9064 pies, ponerse al siguiente dia en pocas horas á la altura de 11841 pies y desde allí estacionarse á la altura de 9350 pies, habiendo recorrido una longitud de 250 millas.

Con el fin de que se vea más claramente las distancias, alturas, temperaturas, &, que está obligado á soportar un Tuberculoso que de la Costa se dirije á Quito, exponemos á continuación las vias de comunicación existentes, por Babahoyo y por la nueva del ferrocarril, haciendo presente que por la via de Babahoyo el viaje es por lo menos de ocho dias.

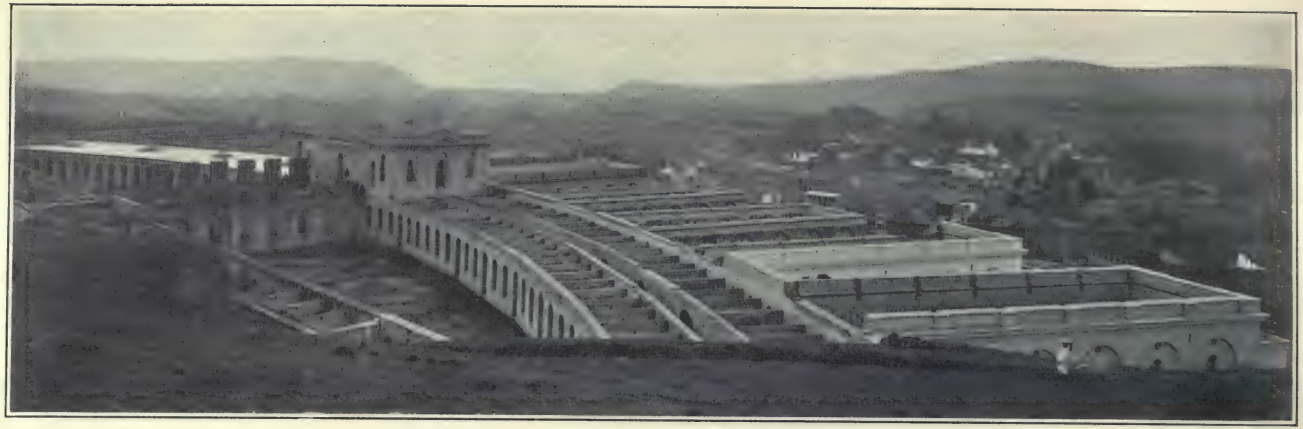
El viaje de Guayaquil á Quito lo dividiremos en varias secciones, según las distintas vias que se han tomado antes de ahora y aun pueden tomarse, así veremos:

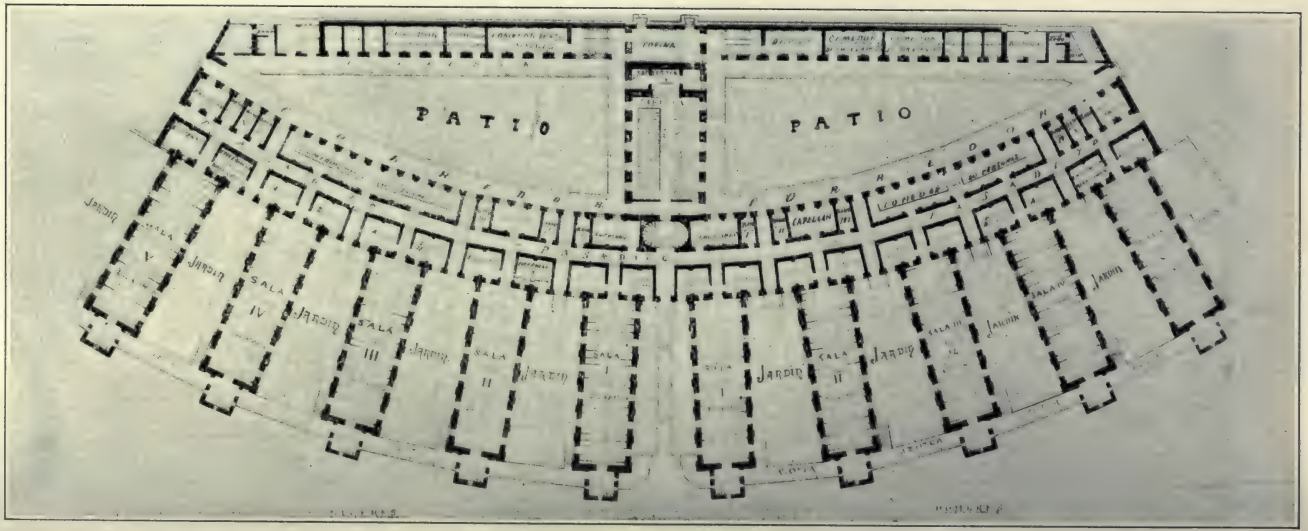
CAMINO DE GUAYAQUIL Á GUARANDA POR POZUELOS.

Nombre de Lugar.	Lugar de Altura.	Alt. en Mtr.	Temp.
Guayaquil	Cuidad.	0	27°5
á Pozuelos	Pueblo.	146	..
á Rios Sn. Antonio	Confluencia.	877	..
á Rios Sn. Antonio	Casas superiores.	1478	..
á Yama-Alpa	Casas del cascajal.	2277	..
á Tambo de Pucará	Tambo.	3060	..
á Camino de Tutapala	Altura.	3200	..
á Pimbulo	Hacienda.	2805	..
á Santa Fé	Caserío.	2693	..
á Guaranda	Fonda "maravilla."	2668	15°

CAMINO DE GUAYAQUIL Á GUARANDA POR BALZAPAMBA.

Nombre de Lugar.	Lugar de Altura.	Alt. en Mtr.	Klm.	Leg.
Guayaquil	Cuidad.	0	0	0
á Balsapamba	..	708	135	27
á Tambo Loma	..	1866	..	..
á Gualashhay	Ensillada de.	2599	150	30
á Tambo de Gobierno	..	3400	155	31
á San Miguel de	Chimbo.	2469	160	32
á Guaranda	Fonda "maravilla."	2668	180	36





El Sanatorio Rocafuerte.

DE GUARANDA Á CHUQUIPOGYO (CAMINO ANTIGUO).

Nombre de Lugar.	Lugar de Altura.	Alt. en Mtr.	Tem.	Kil.	Leg.
De Guaranda	Fonda maravilla.	2668	15°	180	36
á El Pungo	Hacienda.	3002	..	..	..
á Yana Urco	Tambo.	3680	..	..	..
á El Arenal	Punto más alto.	4281	..	..	..
á Totorillas	Tambo.	3910	6°.5	..	..
á Chuquipogyo	Tambo.	3604	10°.1c.	..	..

DE GUARANDA Á CHIQUIPOGYO (CAMINO NUEVO) (QUE NO LO ES).

Nombre del Lugar.	Lugar de Alt.	Alt. en Mtr.	Tem.	Kil.	Leg.
De Guaranda	Fonda maravilla.	2668	15°	180	36
á Tambo de Pucará	Llilluco.	3024	11°.8c.	..	..
á Chinibamba	..	3298	..	..	..
á Loma Llangana	..	3450	..	..	..
á Panza pié de arenal	Reunión dos caminos.	4124	..	..	..
á El Arenal	Punto más alto.	4281	..	..	..
á Totorillas	Tambo.	3910	6°.5c.	..	..
á Chuquipogyo	Tambo.	3604	10°.1c.	..	..

DE GUARANDA A CHUQUIPOGYO (CAMINO DE GANQUIS).

Nombre del Lugar.	Lugar del Alt.	Alt. en Mtr.	Tem.	Kil.	Leg.
De Guaranda	Fonda maravilla.	2668	15°	180	36
á Puente de Totorillas	Tambo.	3910	6°.5	210	42
á Chuquipogyo	Tambo.	3604	10°.1	215	43

DE GUAYAQUIL Á CHUQUIPOGYO (POR CHIMBO).

Nombre del Lugar.	Lugar de Alt.	Alt. en Mtr.	Temper.	Kil.	Leg.
De Guayaquil	Cuidad.	0.80	27°.5	..	..
á Puente de Chimbo	Estación ferroc.	345	..	85	17
á San Pablo	Hacienda.	636	..	95	19
á Margarita	Paso de la cordillera.	3131	..	..	..
á Alpachaca	Hacienda.	3095	..	125	25
Río Chico	Puente.	3114	..	175	35
Altura del camina entre Cajabamba y Guamote	..	3332	..	..	..
Chacabamba	..	..	..	195	39
Laguna de Colta	Capilla.	3228	..	200	40
Chuquipogyo	Reunión de tres caminos.	3604	10°.1	230	46

DE CHUQUIPOGYO Á QUITO.

Nombre del Lugar.	Lugar de Alt.	Alt. en Mtr.	Temp.	Kil.	Leg.
Chuquipogyo	Tambo.	3604	10°.1	215	43
á Sanancajas	Altura del camino	3607	..	220	44
á Mocha	Pueblo.	3284	..	230	46
á Ambato	Plaza principal.	2608	10°.3	250	50
á Unamuncho	Altura del Camino	2792	..	265	53
á San Miguel de Latacunga	Pueblo.	2700	..	275	55
á Latacunga	Plaza principal.	2881	14°.2	290	58
á Cuilchi	Puente.	3069	..	315	63
á Santa Ana	Tambo.	3150	12°.2	320	64
á Huinzha	Altura del camino	3604	..	..	..
á Machachi	Tambo.	2935	..	345	69
á Ushco	Tambillo.	2802	13°.8	355	71
á Arcadia	Hacienda.	2954	..	370	74
á Quito	Plaza Mayor.	2850	13°.5	380	76

DE GUAYAQUIL Á QUITO, POR EL FERROCARRIL DEL SUR.

Nombre del Lugar.	Distancia Parcial en Millas.	Distancia Genrl.	Altura en Pies.
Guayaquil	..	..	..
á Narangito	33.8	33.8	100
á Bucay	23.2	57	975
á Nariz del Diablo	28.7	85.7	6270
á Guamote	26.7	112.4	10000
á Chuquipogyo	31	152.4	11841
á Ambato	26.5	178.9	8435
á Machachi	51.5	229.4	9508
á Quito	20.6	250.0 Millas	9350 Pies

Par dar término á esta memoria, nos resta hacer presente que en esta Cuidad de Quito, el dia 13 de Julio de 1901, se instaló la Liga Internacional contra la Tuberculosis en el Ecuador, bajo la Presidencia del Sr. Dr, Dn. Carlos R. Tobar, elegido para ese merecido cargo tanto por los Srs. Drs. que concurrieron á esa sesión, cuanto por acuerdo del Hble. Congreso Médico Latino Americano reunido en Santiago de Chile en ese mismo año; el suscrito, en la Sesión ya mencionada, tuvo el alto honor de haber sido elegido Secretario de la Liga; pero desgraciadamente ésta no tuvo tiempo sinó para efectuar los nombramientos de los Socios Activos y Honorarios, y las Comisiones relativas á los Subcomités Provinciales; puede decirse que estaba aun organizándose la Liga cuando sobrevino la separación del Sr. Dr. Tobar su dignísimo Presidente, separación que dió por resultado inmediato, que faltando en la Asosiación esa poderosa y activísima palanca, cesaran los trabajos y se extinguiera la Liga como se extingue una planta presiosa

cuando le falta el riego vivificante. Hoy cúmplenos solamente hacer votos porque se reorganice la Liga contra la Tuberculosis en el Ecuador, á fin de que élla con su ejemplo, suscartillas sobre profilazia, &, &, en suma, con sus publicaciones acerca de la lucha contra la Tuberculosis, inculque en nuestro pueblo, las principales reglas sobre higiene, el temor al contagio de la Tuberculosis, &. &. y, sobre todo, exite á las Autoridades locales para que no permanesca como letra escrita y muerta la *Declaración Obligatoria*, toda vez que esa es la única manera de poder verificar el aislamiento de los Tuberculosos y, como consecuencia, la desinfección obligatoria; más aun si se considera que en nuestro pueblo, es la gente pobre, la de raza meztisa, la que más atacada se encuentra por esta terrible enfermedad, y la que por el hecho de ser pobre, facilmente se someteria al buen tratamiento observado en un Sanatorio; siendo todavía más necesaria la reclusión y curación de estos enfermos, si se considera que es la población jóven, la de trabajo, la que figura en mayor número en nuestras estadísticas; razones muy poderosas son las apuntadas, para insistir acerca de la práctica de la declaración obligatoria en el Ecuador, declaración que hoy se encuentra en vigencia como medio para evitar el contagio de la Tuberculosis, en muchísimos paises muy civilizados como: v, g, Alemania en cuyo Plán de Conjunto de las Instituciones contra la Tuberculosis, promulgado por el Comité Central en Abril de 1903, se lee: 1° Declaración obligatoria; 2° Pesquiza especial de los enfermos; y así mismo la vemos establecida en otros paises, como en el de las libertades bien entendidas, en los Estados Unidos de Norte América en que existe desde el año de 1894; en Sajónia desde 1900; en Noruega desde 1901; en Itália desde 1901; y, desde hace poco, relativamente, en Inglaterra, &. &. siendo muy notable el hecho de que en la mayor parte de los paises donde se encuentra establecida dicha ley, su contravención dá lugar á penas gravísimas.

Porque no sea demasiado extenso este trabajo, y porque ha llegado el tiempo en el que debe ser enviado al Congreso, no expongo los casos de Tuberculosis recojidos en mi práctica profesional y solamente me limito á dejar constancia de que es la Tuberculosis pulmonar la que se observa con mayor frecuencia tratándose de Tuberculosis; y que, al tratarse de Tuberculosis pulmonar, la forma frecuente, y hasta puede desirse constante es la forma tórpida, la de marcha lenta, la caracterizada por tos, dolores toráxicos no muy fuertes ni bien determinados, fiebre pequeña é inconstante, algo de anorexia, á veses sudores é insomnios, y, como síntoma dominante, opresión pulmonar y demacración general, y además los signos propios que se observan á la percusión, auscultación, &. &. La forma hemoptóica no se puede desir que sea rara, pero tampoco se puede asegurar que sea frecuente y esas formas agudas, esa granulia confluente, generalizada, esa forma que se ha dado en llamar Galopante, esa es rara, y, de ordinario, se observa en individuos jóvenes, no en desendientes de Tuberculosos, pero si en aquellos seres que

habiendo sido robustos han estado expuestos á un contagio directo y que debido á sus malas costumbres, y otros causas de depauperación orgánica, han tomado la Tuberculosis.

Termino felicitando á la Sociedad Nacional para el Estudio de la Tuberculosis, por la noble y benefactora labor que ha emprendido, y, á la vez felicito al Hble Cuerpo Directivo y Miembros del 6° Congreso Internacional sobre Tuberculosis que se reunirá en Septiembre de 1908 en Washington (1° que se celebra en los E. E. U. U. de América); por cuanto él está llamado á difundir en el mundo entero los conocimientos más propicios para combatir y triunfar en la lucha contra la enfermedad que mayor número de víctimas hace en todo el Globo; contra la Tuberculosis, enfermedad que ha recibido golpe de meurte por la reunión, en Washington, del Congreso Internacional sobre la Tuberculosis.

THE FIRST SIX YEARS' WORK OF THE URUGUAYAN LEAGUE AGAINST TUBERCULOSIS

By Dr. Joaquin Salterain,
Montevideo.

Now that six years have elapsed since the Uruguayan League against Consumption was founded, we can well value the worth of its work, hopes, and ends, as we are free from any inebriating enthusiasm, and have obtained most valuable experience and information. Therefore while reporting on the work which has been carried out by this institution during the last three years, after the report of 1904–1905 was drawn up, we avail ourselves of this stimulating opportunity to look back on the past, and recapitulate something of what we have done.

To begin with, it is an undeniable fact that the doctrine has been preached and spread in all parts of the country, that this institution has taught, and is teaching, by means of an active and intelligent campaign, the dangers of contagion and the danger of spreading germs among those who live in a confined space, the baneful influence of bad habits, especially of alcoholism, the sequel, in a word, to everything which enervates and weakens the human family.

Having familiarized the word "consumption," we have done something more than add one word more to our vocabulary. We have made light in the midst of a dark and unknown world; we have taught, even to the ignorant and obscure, a series of home truths, which to-day have found a prominent place in the mind of the people. Thanks to an active campaign, we have been able to convince the incredulous, to interest all, more or less, showing the dangers and marking the path to be followed, if these are to be avoided.

This work of teaching, in itself alone justifies the founding of the League, more so, as its simple demonstrations, made clear to all, become still stronger by persuasion, evidence, and reasoning methods, free from any dogmatism, which always "handicaps" the most happy initiatives.

To-day the whole country, from one end to the other, knows that consumption is a social calamity; it also knows to-day that the disease can be cured, in all periods, and that it may always be avoided. And this knowledge, which means progress, is one of the results of our action.

This conquest is solely and exclusively the work of the Uruguayan League after six years of constant toil and labor. But can it be said that the scope of its action has been limited to this?

Dispensaries as a Means of Combating Consumption.

Even supposing a perfect organization—a thing which even the majority of the countries of the civilized world cannot claim—the number of consumptives, or candidates to same, on account of organic insufficiency, is so large that all cannot receive assistance.

Legions of consumptives pass their nights in hospitals and suitable asylums; thousands struggle through a fatiguing existence in their wretched homes; many wait an empty bed, hitherto occupied by a dying companion, in order to take his place, if only for a brief period. To how many, alas! even this hope is forbidden, because domestic occupations impose the necessity of work, and these unfortunates must continue spitting blood and coughing up pieces of diseased lungs.

The rest, candidates to become consumptives, either owing to organic debility, physiological debility, or other causes, form the dregs of the human crowd, which the social tide constantly casts up. To counteract such great deficiencies the dispensaries are by no means a certain remedy, taking into consideration the enormity of the evil. But it is no less true that the assistance they afford, the help they render, and the food they distribute, constitute a valuable contingent, which, if not successful in every case, will at least succeed sometimes.

Were the social defense definitely arranged, a selection would be established between the condemned and those who may be cured, and instead of helping the first (unfortunately, the more numerous), the dispensary would limit its action to those who present primitive scars ("*lesiones primitivas*"), which are more easily cured.

The beds which public charity is able to provide are distressingly few, and were they sufficient to accommodate all, it must be remembered that patients in general prefer a treatment which allows them relative independence to one which condemns them to the severe discipline of the hospital or house of isolation.

The final result is an excess of incurable patients, and an enormous amount of money is spent in assisting chronic cases; whereas the whole effort should be devoted to those predisposed, or who present alarming symptoms. But the institution is supported by the authorities and depends on public charity; how is it then possible to deny food and assistance to the forsaken, who possess neither shelter, roof, nor clothing, and who have not even sufficient strength to work to obtain the necessaries of life; besides,

it is proved by our dispensaries, in a most eloquent and suggestive manner, that among many of the irrevocably condemned to a rapid end some recover, and often regain sufficient strength to enable them once more to commence the daily struggle; others are fortunate enough to prolong their days. It must be remembered that the serious factor which aggravates the troubles of legions of consumptives is poverty (misery); therefore can we close our doors and deny a helping hand where the lives of so many are at stake?

Dispensaries are therefore active elements whereby the disasters of consumption are lessened, ameliorated, and even averted, and to meet the demands of social charity, and in the worst cases, prolong the lives, which, although precarious, society has not the right to banish into oblivion. These are the conclusions at which we must logically arrive, after working our dispensaries unceasingly for six years.

Dispensaries as a Means of Preservation.

If we compare what is in reality taught to and expected from a consumptive patient during his stay in a hospital or in the house of isolation, with what the League continuously recommends, by its standing rules, it will be seen that the balance is undoubtedly in favor of the latter.

In the hospital ward the patient receives a daily visit from the resident doctor, whose duty it is to instruct his students, explaining the symptoms of each case, applying technical science, even in the minutest details; but beyond the usual prescription which soothes pain, or prevents the progress of an attack, and once the teachings of science have been carried out, and the health of the patient perhaps improved, what does the unfortunate patient learn concerning taking care of himself, or regarding collective preservation?

Hundreds of impecunious sick plead for help and succor in the wards of our charitable institution. It is true that there they are scientifically classified—they are isolated; they are treated in the best manner possible by methods worthy of the highest praise, but nothing more.

The work of our dispensary is of a completely different nature. Before an invalid is taken under our care his surroundings are carefully examined, and his mode of living is a primary source of investigation; he is then instructed how to take care of himself and how to avoid contagion to those who live near him; he is obliged to keep his person clean, as well as his room; the principles of elementary and practical hygiene are made thoroughly clear to him, and it is only on condition that the patient complies with these precepts that help and attendance are tendered.

And in this manner valuable lessons are taught: habits of cleanliness and practices of self-preservation, which until recently were absolutely

ignored, are now gradually, but surely, being taught by one to the other—teachings which travel from house to house, and from home to home. Open windows, for example, and the use of spittoons were in years gone by hygienic habits respected by few. To-day, in the poorest home, where an inspector of the League has called, invalids, and even many who are not, strictly comply with these precepts.

We may say the same with regard to personal cleanliness, of the distance which ought to separate one bed from the other, of sprinkling water on the floor before sweeping, of clean and well-ventilated bed-rooms, of the suppression of curtains, and of innumerable minor practices, with the help of which rules of living many may recover, and a great number of predisposed are protected.

Unfortunately, our means are limited. In numerous cases, however, where the symptoms of the patient are very serious, he is located in a ward of the house of isolation; in other cases the invalid is isolated from those with whom he lives. He is supplied with funds, which enable him to rent a room for himself; and in every case invalids are obliged to be isolated as much as possible from other inmates, in order that the rest may be protected.

Our success hitherto has been so satisfactory that in many instances, not only has the patient improved, but we have undeniable proofs that the disease has not been spread. The dispensaries, therefore, by the lessons they teach and the discipline they enforce, constitute means of preservation worthy of being included in our war against consumption.

The Dispensaries as a Means of Cure.

It has been stated, and with truth, that it is high time that hospital attendants should possess all technical resources which science requires, but, on the other hand, if patients are allowed to room together, there is the disadvantage of bringing sorrow and unhappiness under the same roof.

A patient has continuously before him the sight of numerous fellow-creatures in misfortune; the comparison and contrast of so much unhappiness thrown together create a most doleful atmosphere, which breaks his spirit.

Physicians, who have become such through daily toil in hospital wards, know this by heart—consumptives more than any other patients, with excited brain and feverish imagination, soon lose the little strength left to them, and lose heart under such trying circumstances far more than others.

Therefore, were sufficient attendance possible with more encouraging surroundings, the cure of consumptives would be more probable and frequent.

The working of the dispensary counteracts the influence of undesirable surroundings and does not completely isolate a patient from his family,

nor is the patient entirely denied his liberty; the treatment is more in harmony with the nature of his disease, and more closely contemplates the moral hygiene of his mind—a rigid discipline is not imposed. Facts go to prove this in a striking manner; otherwise, it would not be possible to explain the interest shown by many of our invalids, but by taking into account the influence exercised by surroundings, and the nature of the attendance afforded,—which is continuous, but never reaches excessive severity,—and as far as results are concerned, the figures laid before you will show that they are far from discouraging.

In the Department of Montevideo alone, during the last six years, we have attended 1230 consumptives of all classes in our dispensaries, the majority of whom presented advanced symptoms, and among them were many incurables. Of this number, 233 have been discharged, apparently cured, thus giving us a proportion of 18.94 per cent. of successes—that is to say, one-fifth of those who received attention. And if, as we have already remarked, the deplorable condition of the majority of invalids is taken into consideration, these figures establish the credit of the institution. More so, all those who are classified under the heading of cured have been carefully watched from one year to another, to ascertain the actual condition of each case, not with the idea of dazzling the public with fantastic statistics, but in order to strengthen our conclusions with undeniable and illustrative facts.

Dispensaries are therefore most useful, and first-class factors in the cure of consumption, and they have already given ample proofs of their importance in Uruguay.

At the present moment eight of these institutions are working steadily throughout the country—three in Montevideo, one in Minas, one in Treinta y Tres, one in Salto, one in Paysandu, and one in San José. Those situated in the interior, which deserve special mention, are: First, the one in Salto, organized on a solid basis, thanks to the intelligent zeal of Dr. José L. Amorin. Secondly, the one in Minas, directed under similar circumstances by Dr. Uberfil R. Acuña. Then the one in Treinta y Tres, under the direction of Dr. A. M. Bargo. And, lastly, the one in Paysandu, directed by Dr. Luis Guitierrez, and the one in San José, organized within the last few months by Drs. Giampietro, Freitas, and Chiolini, all of whom coöperate in the work.

The figures referring to our "Dispensaries Maciel" Nos. 1, 2, and 3 in Montevideo show the following data during the years 1905–1908:

Dispensaries.	Total of Invalids.	Cases Cured.
Maciel No. 1	263	53
" No. 2	268	57
" No. 3	216	30
	747	140

The proportion of patients discharged as cured is as follows:

Dispensary Maciel	No. 1	20.15%
" "	No. 2	21.26%
" "	No. 3	13.88%

The average proportion of patients cured during 1905–1908 was 18.60 per cent.

The number of fatal cases was as follows:

		Number of Patients.	Per Cent.
In Dispensary Maciel	No. 1	13	4.94
" " "	No. 2	38	14.98
" " "	No. 3	31	14.35
Total		82	10.98

You will see that this average is relatively encouraging, as we note a total of 747 patients who received assistance, 140 were discharged as cured, and only 82 were fatal. Summing up the figures taken from the reports of the directors of our dispensaries:

Movement.	Dispensaries Maciel.			Total.
	No. 1.	No. 2.	No. 3.	
Consulting days	394	429	430	1253
Consultations	8776	9340	6510	24626
Sputa analyzed	274	82	166	622
Domiciliary visits	2185	1596	1499	5280
Recipes prescribed	6947	8411	6142	21500
Room-spittoons distributed	171	246	170	607
Pocket spittoons	15	10	8	33
Persons examined who proved not to be affected	2101	2038	613	4752

Supporting Members.

Although it may be a lamentable fact to have to record, it is nevertheless a true one, that the number of supporting members is not on the increase, but is decreasing as rapidly as our expenditure increases.

Were it not that the League is able to count on the subvention it receives from the National Committee of Charity, most benevolently and generously granted by the government, or did it not count among its protectors the anonymous, munificent, and charitable protector who gave the land necessary to erect the building in which we meet, and who at a later date (without disclosing his name) presented the League with the sum of five hundred thousand francs with which to erect a sanatorium, and the never-ending help of the well-deserving Messrs. Pereira and Rossel, of a

CONDITION IN WHICH THE 140 CASES WERE DISCHARGED AS CURED OR RECOVERING.

	Year 1905–1906 (Fourth of the League).				Year 1906–1907 (Fifth of the League).				Year 1907–1908 (Sixth of the League).				Total of three Years, 1905–1908.			
	Dispensary No. 1.	Dispensary No. 2.	Dispensary No. 3.	Total.	Dispensary No. 1.	Dispensary No. 2.	Dispensary No. 3.	Total.	Dispensary No. 1.	Dispensary No. 2.	Dispensary No. 3.	Total.	Dispensary No. 1.	Dispensary No. 2.	Dispensary No. 3.	Total.
Discharged as cured.....	19	21	2	42	17	24	15	56	17	12	13	42	53	57	30	140
No. of days attended to.....	7008	10363	790	18161	6474	8819	8819	25537	7849	5144	7248	20241	21331	25751	16857	63939
No. of days' attendance given to each invalid....	369	493	395	432	381	427	684	456	462	429	558	482	402	452	562	456
Age of those cured	19	23	17	21	22	23	23	23	325	268	264	859	1071	1288	648	3007
Average age.....	370	477	35	882	376	543	349	1268	19	22	20	20	20	23	22	21
Total weight on entering.....	838.200	997.500	109.400	1945.100	812.200	1042.500	664.400	2515.100	797.000	587.200	589.300	1964.500	2447.400	2618.200	1363.100	6424.700
Total weight on leaving.....	899.700	1083.100	137.000	2119.800	882.300	1132.800	737.200	2752.300	897.100	615.300	652.400	2164.800	2679.600	2831.200	1526.600	7036.900
Increase of weight.	61.500	85.600	27.600	174.700	70.100	90.300	72.800	233.200	100.100	37.100	63.100	200.300	232.200	213.000	163.500	612.200
Average weight on entering	44.116	47.500	54.700	46.312	47.776	43.437	44.293	44.912	46.882	48.183	45.440	46.774	46.177	45.933	45.737	45.820
Average weight on leaving	47.352	51.756	68.500	40.471	51.900	47.200	49.147	49.148	52 770	51.275	50.185	51.543	50.558	49.670	50.886	50.263
Balance in favor of each patient .	3.236	4.076	13.800	4.159	4.124	3.763	4.854	4.236	5.888	3.092	5.145	4.769	4.381	3.737	5.449	4.375

small number of generous and benevolent persons, and that nucleus of untiring supporters, our Ladies' Committee, the existence of the League would indeed be precarious.

The Building of the League and Projected Sanatorium.

The Uruguayan League, the first among those of America, and perhaps even among the majority of similar institutions in Europe, has had the honor of erecting a building of its own, a model dispensary, which we can, without blushing, show to both kin and alien. The building has every hygienic requirement. The most insignificant details of the edifice have been so thoroughly completed that we may well term it irreproachable. The land, the generous gift of an anonymous hand, covers a superficial area of 1054 square meters 96 decimeters. From the very commencement we prepared to isolate the building from the neighboring edifices; it was therefore erected in a space measuring 14 meters 30 centimeters frontage by 22 meters 14 centimeters deep. It is true that on account of being situated in the center the expense of building was necessarily increased, but, on the other hand, the hygienic conditions were greatly improved, leaving sufficient ground for a small garden, which was laid out around the building, thereby allowing perfect ventilation and access of abundant light.

To the rounded angles of all the walls, skirtings, and walls, faced with porcelain tiles, have been added floorings perfectly smooth and perfectly water-tight, numerous ventilators of the latest pattern. Electric stoves of the best makers in Germany, which allow the temperature to be increased rapidly and continuously at pleasure, have been distributed throughout the building; and if perchance some of the details of the frontage, such as the statues on the staircase, and the busts of Professors Villemin and Koch, which adorn the upper part of the building, should be considered as too ornamental, it is only just to record that the symbolic and esthetic details were not paid for by the League. Our benevolent protector, Mr. Alejo Rossell y Rius, has been the instigator and donor of this generous presentation.

We must all remember the intelligent direction of Engineer Mr. Leopoldo J. Tossi, the honest conduct of the constructor, Mr. Nicolas Capuano, and the generous attitude of the electrical engineer, Mr. H. Forester, who drew up the whole plan for the electrical heating, and though a young beginner and a foreigner, has refused to accept any remuneration.

The distribution of the building and the principal details of same are as follows:

Underground.—Two departments for baths, with twelve douches and two closets, containing large baths. Two ward rooms, a hall, a room for

ironing, a saloon deposit and kitchen, reservoir of hot water, etc., and two water-closets.

First Floor.—Principal hall, inspection room, clerks' departments, museum of tuberculosis, porter's room, independent side-entrance for invalids, consulting rooms, laryngological cabinet, laboratory for analysis, two waiting-rooms, room for the distribution of food, large hall, and two water-closets.

Second Floor.—Large saloon for public meetings, sewing-room, room for Ladies' Committee, toilet, library, room for meetings, president's office, receiving room, secretary's office, accountant's office, and two water-closets.

Light, Heating Arrangements, and Ventilation.—One hundred and ten electric light lamps, fifty-nine electric stoves, fourteen gas-tips, nineteen current receivers for ventilators, movable lamps, drying apparatus and irons, six arc lights, and fifty-two ventilating tubes.

The total cost of the building, including furniture, light fittings, etc., amounts to $33,363.46—a sum which we consider low if you take into consideration that labor is so expensive to-day, and that the materials employed were all of the best, from the granite foundations to the last panelings.

At the time of the official inauguration of the new building, which ceremony His Excellency the President of the Republic, Dr. Claudio Williman, was good enough to attend, the good news of a new and more valuable donation was made known to us. Some months later the news was confirmed, and I, in my capacity as president of the League, received the sum of 500,000 francs in public bonds, which are given exclusively toward the erection of the Sanatorium.

The donation, which is anonymous, and of such a considerable sum, does not call for any remarks, but as such acts are rare, they are deserving of public gratitude. The committee, while accepting the valuable gift, decided that when the projected building be finished it should bear the name of its generous founder, as a legitimate and due homage to such spontaneous charity. His name, unknown until now, will ever be remembered and will serve as an everlasting example. He has worked among the working classes, and now he returns to them his hard earnings—blessed be his memory!

As the construction of a sanatorium is a very serious undertaking, and the cost of one, for the poor patients, amounts to about $300,000, if it is to be finished with every requirement of light, ventilation, etc., besides the heavy expenditure of keeping it in working order, we consider it prudent to study the question with care and time in order not to launch out into an unsuccessful undertaking, which would be unpardonable, dealing, as we are, with charitable moneys.

Sanatoriums are nowadays very much discussed, even in Germany, the classical fatherland of sanatoriums for consumptives, and many of their advantages are contested; it is therefore highly convenient to look at the matter thoroughly, to study their good and bad points, and see what is to be adopted and what is to be left out and abandoned.

Instead of constructing large and costly buildings in our country,—where, it is true, we are not endowed with highland climate, but where, on the other hand, large tracts of easily drained country are plentiful,—it would appear at first sight more practical to purchase a large area, either near the seashore, or far in the interior, and there establish large and dense plantations of trees, erecting here and there small buildings, suitable for a cure of rest, and which would have the advantage of abundance of pure air combined with agreeable surroundings.

Our Magazine.

Our monthly bulletin, which during the first years of the foundation of the League was most diligently and cleverly directed by Dr. Ramon Montero y Paulier, was at a later date turned into the "Tuberculosis," the name it now bears, and is at present date under the able direction of Dr. S. B. Rodriguez, Mr. Oscar Deffeminis acting as secretary.

The Ladies' Committee.

As has always been the case, we have to remember this most important branch of our institution with the warmest gratitude.

This warm-hearted committee work quietly, and fulfil their most noble mission with most fruitful results. They sew plentifully for the poor—they visit consumptives—they give out clothing to the needy—they obtain favors, subscriptions, and other sources of income—they keep up the enthusiasm in the ranks of the members.

Perhaps we owe to the Ladies' Committee the greater part of our success.

The following figures confirm my statement:

LADIES' COMMITTEE.

Funds collected and paid into the treasury during the last three years	$9187.56
Festivals which have been given under their patronage	30
Invalids visited and helped	786
Articles of clothing made by them	2198

Income and Expenditure.

The total of our income and expenditure during the six years the Uruguayan League against Consumption has been working is as follows:

	Income.	Expenditure.
First year (1902–1903)	$7,239.79	$3,356.46
Second year (1903–1904)	23,693.18	15,564.20
Third year (1904–1905)	20,557.55	18,006.77
Fourth year (1905–1906)	32,771.74	21,392.54
Fifth year (1906–1907)	33,619.23	35,877.32
Sixth year (1907–1908)	130,992.08	46,374.83

If from the total net capital ($157,122.73) the result of the inventory taken on the 30th of last June—particulars of which are published in the report—we deduct the sum of $94,418.88, the donation which is exclusively assigned for the building of a sanatorium, and cannot be disposed of otherwise, as well as the sum of $47,983.04, the cost of our model dispensary, and several other items, we remain with a balance of cash in hand amounting to $15,000.00, with which to meet our budget.

The work of the Uruguayan League against Tuberculosis, notwithstanding what has already been done, is, we may say, just entering the period of growth. Until the present date its mission of circulating truth and civilization has been limited to making itself known, and to winning for itself the sympathies of the public, showing a helping hand, when possible, in the dark shadow where misery and desolation are too well known. From to-day onward its sphere of action must be extended as widely as the magnitude of the problem may require and the great interest which several questions demand.

It is not sufficient for a few to struggle toward the end, as it is not sufficient that an isolated group stand up for the defense of all; it is necessary that each and every one should tender a helping hand, because the problem is one which affects the interests of all, of problems, let it be repeated, which affect the very origin, the very elements, of life.

The energy of a race is not the result of the isolated strength of given groups; it is the result of the energies of the sum-total. When the majority cast a favorable balance, the final product is a high standard of perfection and selection, the distinctive character is profiled in definite lines, and manifests itself conspicuously enough to produce those striking qualities which we call the genius and glory of nations.

THE FIGHT AGAINST TUBERCULOSIS IN PORTUGAL.

By Dom Antonio Maria de Lancastre,
General Secretary to the National Institution for Assisting Consumptive People,
Lisbon.

If, in the olden times, the middle ages, the Renaissance, and for a long time during the modern period, humanity has lived oppressed by the terror of the plague and by the fear of leprosy, erecting thousands of lazarettos and hospitals as bulwarks against those scourges, tuberculosis, notwithstanding its claims to antiquity, has only in the present day, by means of a quick progressive expansion, acquired such a social importance that, as an evil, it ranks far above the two forementioned diseases.

It is a fact that tuberculosis is an infectious and contagious disease, which follows the laws of its congeners, but it is distinguished by certain etiological conditions which render it a social disease also. Hence, the clear deduction that some of the means to be employed against this disease must be the ordinary ones adopted against all infectious and contagious diseases; and the others must be of a social nature, taking into account those conditions that contribute so much to the possibility of infection; and so the agencies to be put in action are twofold—private initiative and the initiative of the State, indissolubly allied, as the one without the other would render the problem unanswerable, by the suppression of one of its terms.

All measures will be useless unless everybody collaborates; hence the necessity of a rational and sure propaganda, conscious of its aim, and directed solely in order to satisfy the aspirations of all. And there is nothing more difficult than molding public opinion and commanding it. One must take in account the mass of ignorance and stagnation of indifference, so hard to move, when he intends to have a uniform reaction against the evil feared by everybody, but which most people impute to fatality, being content with appealing to Providence for help. Propagandism is the great difficulty in southern countries, where individualism has accentuated itself with the lessening of their importance in the progress of the civilization of the world.

As it happened in every country, tuberculosis sometimes attracted the attention of the State and of private people, measures being adopted without a scientific foundation and established upon the two feelings which have ever moved humanity—fear and piety. So we find in Portugal rudimentary prophylactic measures against tuberculosis in the seventeenth and eighteenth

The Institute Queen Dona Amelia.

centuries, which especially concerned travelers who went from Europe to Rio de Janeiro to find relief for their pulmonary lesions.

The first establishment for the treatment of consumptive people was founded on April 18, 1853, by Her Imperial Majesty, the widow of His Majesty Dom Pedro IV, in the city of Funchal, on behalf of the poor who were attacked by this terrible disease, of which the Princess Dona Maria Amelia, Her Majesty's daughter, had died.

The Convalescent Hospital of the Princess Dona Maria Amelia is still working in a building of its own, which was inaugurated on February 4, 1862, possessing its own revenues for the treatment of twelve people. Up to 1884 nothing practical was done, notwithstanding the great master Sousa Martins having so often set forth the question at the Medical Society, where he dealt broadly and with genial intuition with the several problems concerning tuberculosis. In that year, however, the scientific mission to Serra da Estrella, which was inspired by that remarkable man, gave that subject an evidence of actuality which public attention could no longer disregard.

Some steps of private charity followed the imperial initiative of 1853. In 1886 Doctor Pereira Cardoso, who was a peer of the realm and a medical man also, bequeathed to the Misericordia of Oporto 12 contos de réis (about £2400) for the institution of an infirmary containing sixteen beds, only for consumptive females. In 1890 the beneficent Antonio Ferreira da Cunha Lima bequeathed to the same Misericordia an important legacy, which allowed the foundation of a new infirmary for sixteen consumptives of the male sex.

In 1887–1888 the noble Count of Samodães, the Director of the Oporto Misericordia, proposed that a committee should be appointed to agree about the way of carrying out the measures for the seclusion of consumptives of both sexes in a special pavilion adjoining the buildings of the same institution. The proponent, Monsignor Antonio José Rodrigues Pereira, Antonio Iria Carvalhal, Bento Antonio de Freitas Guimarães, and the Viscount da Gandara, formed the committee. Difficulties of different sorts hindered the carrying out of the purpose.

At the beginning of the reign of King Don Carlos I, Her Majesty Queen Dona Amelia, whose sole preoccupation during her much tried life has been human misery, appointed Professors Oliveira Feijão, Alfredo da Costa, Antonio de Lancastre, and the military engineer, Duval Telles, to study the plans for the founding of a great maritime hospital.

If Her Majesty's wish has not been accomplished, that study has served as a starting-point for two works of great social importance, by initiative of the gracious queen, viz., the Dispensary of Alcantara, where thousands of children undergo treatment, and so many hundreds are saved that it has

contributed to lessen the infant mortality in Lisbon; and the National Institution for Assisting Consumptive People, the purposes, means, and working results of which will be analyzed.

In 1894, by decree of April 12th, obligatory declaration of tuberculosis was established.

In Parliament, the peer Simões Margiochi, and the deputy counsellor Moreira Junior, called the attention of the Government by requesting that steps should be taken against tuberculosis. This they did at different legislative sessions and on several occasions.

The first congress on tuberculosis was held in Portugal, March, 1895. Many of the serious problems were deeply discussed. That certamen, which was one of the first in Europe, was initiated by the distinguished Professor of the Coimbra University, Doctor Augusto Rocha.

On November 27, 1897, the Society of Medical Science appointed a committee to study the question of hospitals for consumptives. Professors Bettencourt Raposo, Alfredo da Costa, Bello de Moraes, Camara Pestana, Eduardo Burnay, Miguel Bombarda, and Dom Antonio de Lancastre were appointed members.

On May 23, 1899, two reports were set before the same Society: one by Doctor Camara Pestana, in which the founding of a sanatorium was proposed; the other by Professor Miguel Bombarda, in which he recommended the founding of a National League against Tuberculosis.

Those reports were set down as order of the day at the Society of Medical Science, on June 6, 1899, and the discussion continued in its sitting of the 13th. Professor Bombarda's proposal was approved of, and that of Doctor Camara not considered, as Her Majesty, the Queen Dona Amelia, had founded on the 11th the National Institution for Assisting Consumptive People.

From that time dates the commencement of the real fight against tuberculosis.

The National League Against Tuberculosis.

Being founded under the patronage of the Society of Medical Science, it became immediately a free institution, uniting the whole medical corporation under the direction of Professor Bombarda.

Following the principle of self-government, it has centers all over the country, at Oporto, Coimbra, Vianna do Castello, Portalegre, Guarda, Bragança, and Beja. These centers, which have the same aims and means in view, are independent, and manage their own business and have no other connection with the other centers, except for the accurate execution of the votes in the meetings of all the groups.

The seat of the League is in Lisbon. A board of directors has the direction of the financial business of the Society, and three committees join the board in the works to be carried out:

A Vulgarization Committee has a bureau of information on every subject concerned with tuberculosis. It also undertakes the distribution of printed matter containing general directions about the illness and prophylactic means, as well as public addresses in all social centers.

A Law Committee, to which the study of the municipal laws and regulations is intrusted.

A Committee of Propaganda in behalf of sanatoriums.

Among the important things done by the League must be mentioned the publication of a paper, "War Against Tuberculosis," for the dissemination of their ideas; lectures given at the Lisbon Commercial Athenæum; the distribution of pamphlets teaching the dangers of tuberculosis.

The League has employed all the means of propaganda used by other associations against tuberculosis. For a long time it had in a kiosk set up on Avenida da Liberdade, in Lisbon, a collection of samples of articles connected with tuberculosis—spittoons, diagrams, tables of statistics, books of propaganda. In short, the League has been enabled to hold four congresses, in which all the great problems of tuberculosis have been discussed. They took place as follows: in Lisbon, in 1901; at Vianna do Castello, in 1902; at Coimbra, in 1904; and at Oporto, in 1907.

The National Assistance.

The National Assistance to Consumptives was founded on June 11, 1899, by Her Majesty Queen Dona Amelia, for the following purposes:

1. The establishing of hospitals, asylums, or infirmaries exclusively for consumptives, in order to mitigate suffering and to prevent contagion.

2. The building of sanatoriums for curable consumptives.

3. The instituting of maritime hospitals for scrofulous children, or for those who, on account of a prenatal disposition, or that acquired by defective nutrition, are liable to contract tuberculosis.

4. The founding of local institutions for the study and treatment of tuberculosis; also for distributing assistance to patients and to their families.

5. The centralizing and strengthening of whatever means might prevent the increase of tuberculosis, lessen its effects, or conduce to the practice of hygienic rules relating to this sickness, and all means to arrest its course, lessen suffering, and promote its cure.

It is, therefore, a Portuguese institution of beneficence, operating throughout the whole kingdom, acknowledged and subsidized by the Government. It has five classes of members, whose yearly subscriptions vary from $24

to $200. Auxiliary members, who subscribe less than $2 annually, are also admitted.

The administrative management of this society is intrusted to a Central Board composed of twelve members, of which Her Majesty, Queen Dona Amelia, is the perpetual president. The financial inspection is committed to a Board of Inspection, composed of three members.

The carrying out of the decisions of the Central Board belongs to an Executive Commission, composed of the General Treasurer and of three members, who are appointed by the Central Board from among themselves. This board, with the exception of the General Secretary, the Solicitor, and the General Treasurer, has its members elected in a general meeting. The non-permanent members of the Central Board, nine in number, are removed every three years by a partial election. The Board of Inspection is elected in the same way

There is a Technical Committee composed of eight members. There is also a Propaganda Committee, divided into subcommissions, as follows: The Committee for "Quetes," a Committee of Festivals, a Committee of Publication, a Prophylactic Committee, a Committee for the Study and Statistics of Tuberculosis, a Committee of Zealous Fellows.

The society depends upon the following income: subsidies from the State, from the local government assemblies of the Azorean Districts, from the municipalities, and one-tenth of that part of the ordinary revenue which the charitable institutions are obliged to contribute, the whole according with the Law of August 17, 1899, and that of June 5, 1903; the fees of its fellows and auxiliary subscribers; the society's revenues from its funds and capital; such is the ordinary income, which, in conformity to the statutes, is destined to meet the current expenses and the support of its establishments.

The capital of the Assistance comprises the value of its buildings and the endowment of the services created and organized with the product of the subscription, initiated by Her Majesty the Queen on June 11, 1899, accrued with the new contributions for the same, and added with one part of its sure revenues, the balance of every year, and the bequests, legacies, and important donations made for the same purpose.

The Maritime Sanatorium at Outão.—The first sanatorium of the Assistance was at Outão, an old castle at the broad estuary of the Sado, near Setubal. It was inaugurated June 6, 1900, with 38 beds, in the inhabitable portion of the castle, and a new building has been added for 128 beds, in 16 infirmaries.

This sanatorium, which is yet unfinished, affords already accommodation for 74 patients, and 64 more will soon be admitted, on the opening of four more infirmaries. Weak, lymphatic, and scrofulous children, from four to twelve years of age, are here treated as indoor patients; and as

soon as the building is completed, it will also admit consumptive children, who may benefit by the treatment at the seaside. From June 6, 1900, to June 30, 1907, 297 children were admitted, of whom 229 were dismissed.

The following result was obtained:

Cured	156
Improved	58
In the same condition	15
Total	229

THE MARITIME SANATORIUM AT CARCAVELLOS was inaugurated on August 24, 1902. It owes its foundation to Doctor José de Almeida, and to the late statesman and poet, Counsellor Thomaz Ribeiro. It is installed in the old fort of Junqueiro, near Carcavellos. It was given in 1901 to the Assistance, which enlarged and completed it, so that it has now room enough for 96 beds, distributed throughout large and well-ventilated infirmaries. It is used for the treatment of scrofulous, weak, and lymphatic boys, from four to twelve years of age, and those attacked by external tuberculosis.

From its inauguration until June 30, 1907, 421 children entered the sanatorium, of whom 360 were dismissed as follows:

Greatly improved	68
Improved	228
In the same condition	60
Dead	4
Total	360

The Summer Colony.—Adjoining the sanatorium there is a ward with splendid accommodation for little boys, selected among the patients of the Lisbon Dispensary, who need a short stay at the seaside. In more serious cases the children go into the real sanatorium.

The colony works from the month of August to November, and has, since 1904, admitted the following number of patients:

In the year 1904; number of children admitted	137
" " " 1905; " " " "	145
" " " 1906; " " " "	135
" " " 1907; " " " "	142
Total	559

Sea-bathing.—With a view of rendering efficacious the tonic and strengthening treatment given at the Lisbon Dispensary, a course of sea-bathing, at Trafaria, was initiated for weak or scrofulous children of from four to twelve years of age. Since 1901, during the months of August, September, and October, a group of 120 children take it by turns to stay twenty-one days. After the bath each child receives a meal of bread and milk.

DISPENSARIES AGAINST TUBERCULOSIS.—The National Assistance to the Consumptives has five dispensaries at work, in Lisbon, Braganca, Porto, Faro, and Vianna do Castello.

Lisbon.—Provisionally installed at Rua do Alecrim, on June 5, 1901, transferred on April 18, 1906, to the Institute Rainha Dona Amelia, in the street Vinte e Quatro de Julho. The medical services, under the care of Doctor Alfredo Lopes, are divided into six consultations: for men, women, children, surgical tuberculosis, oto-rhino-laryngology, etc. Since the inauguration of this establishment, up to June 30, 1907, 42,879 individuals were inscribed at the dispensary, namely: men, 8828; women, 14,581, and children of both sexes, 19,470. The medical consultations were 455,213, namely: men, 137,490; women, 200,046; children, 117,677. There were 4579 houses of consumptive people, during the period of illness and post mortem, and in the case of change of residence, disinfected; 2791 spittoons, both for bed-room and pocket use, with the respective disinfectants, were distributed. Help, consisting of food, was given in the shape of 80,085 rations. From a social point of view the dispensary promoted domiciliary visits, the distribution of meat and bread to poor consumptives, also beds and clothes; and improved the hygienic conditions of many houses.

Braganca.—This dispensary has been working since July 13, 1902. From this date to June 30, 1906, 978 individuals, to whom were given 22,039 consultations, were inscribed as patients there. This dispensary distributes medical aid, meals, etc., to the more needy patients. The medical service is intrusted to Doctor Antonio Olympio Cagigal.

Oporto.—The inauguration of this dispensary took place on January 1, 1903. From this date to June 30, 1907, 5480 patients were inscribed there: men, 1546; women, 2388, children of both sexes, 1546. The number of medical consultations and sessions of treatment reached to 30,150; 11,559 meals were given to poor patients, 287 houses were disinfected, and 542 spittoons given. This dispensary is managed by Doctor Arantes Pereira, who is in charge of the analyses of the expectorations.

Faro.—As at Oporto, the inauguration of this Dispensary took place on January 1, 1903. From that date to December 31, 1907, 367 individuals of both sexes were inscribed on its medical registers, 98 being of the male sex, 193 being of the female sex, and 76 children of both sexes; 19,527 medical consultations were given, as follows: 3433 to children, 10,818 to women, and 5276 to men. The dispensary is installed in a building of its own, which was expressly constructed for that purpose. Here 23,777 food rations have been distributed since its foundation, besides 141 spittoons and 611 kilograms of cod-liver oil. Doctor Alexandre Pereira d'Assis is in charge of its management.

Vianna do Castello.—This dispensary is installed in a building constructed

for that purpose. It was inaugurated on January 9, 1905; 137 individuals had been inscribed there up to June 30, 1906, as follows: 51 men, 48 women, and 38 children, to whom 2148 consultations were given. This dispensary distributed 4628 rations to poor sick people, as well as 58 kilograms of cod-liver oil and 33 spittoons. The medical superintendent is Dr. Antonio Martins Delgado.

All the expenses of the different dispensaries are paid by the Central Board of the Assistance.

Domiciliary Assistance in Lisbon.—Bed-clothes and beds of special type are given by the Executive Committee to the poor suffering from tuberculosis in an advanced stage who attend the Lisbon dispensary. A proposal, in which the want of means of the patient is proved, must be made.

A rigorous disinfection of the patient's house is always made when it becomes indispensable. At the same time an inquiry is made about the conditions in which the patients and their families live.

Services Connected with Tuberculosis.—An order, issued August 4, 1902, granted the Assistance permission to use the Royal Bacteriological Institute Camara Pestana, where the Assistance installed a department with officers of its own, charged with the analyses of the expectoration of its own patients, as well as that of those who had been privately attended. Professor Ayres Kopke is in charge of this service. From the commencement of these services, up to December 31, 1907, 10,955 analyses had been made by that department.

The Central Institute Queen Dona Amelia was inaugurated on April 18, 1906. It is the center of the services of the Assistance. Besides the General Secretary's department, the treasury and library, the office of the "Bulletin Tuberculose," which is the organ of propaganda of the Assistance, is installed there. It has a large hall, for the meetings of the General Assembly, a large tympanum, which opens on the principal front, intended for public instruction.

The Sanatorium Souza Martins is designed for the treatment of curable consumptives of both sexes. It is situated by the side of Guarda, at one thousand meters above sea-level, and consists of three independent pavilions containing 28 beds each, one hospital for intercurrent diseases, a laundry, a post of disinfection, and six independent cottages for rich families. This establishment was inaugurated on May 18, 1907, in the presence of their majesties, and, up to December 31, 1907, it had 117 patients. The medical direction of this establishment is intrusted to Doctor Lopo de Carvalho.

The Suburban Hospital at Portalegre.—This hospital, which is intended for the new consumptives in the district, is now ready to be inaugurated. It contains 16 beds.

The Repose Hospital of Lisboa, which will be named Hospital Dom

Carlos I, will be the natural complement of the work of the dispensary, intended for consumptives who may be saved by a stay of a few months.

A maritime sanatorium at Caminha, and hospitals for consumptives at Coimbra and Braga, are being planned.

The Propaganda.

The Committee of Propaganda, having been constituted on February 4, 1900, under the honorary Presidency of His Majesty the King, Don Carlos the First, began by the publication of about thirty papers on the more interesting subjects connected with tuberculosis, printed in the more widely spread lay journals of the country. They were signed by the first notabilities of the literary and scientific Portuguese world. Moreover, a large distribution of the following pamphlets has been made since 1900:

"Popular aphorisms"	71,200	copies
"Reading-book of precepts against tuberculosis," a summary of the book "Tuberculosis," by Doctor Curry Cabral	108,300	"
"Prophylactic instructions against tuberculosis"	116,700	"
Placards drawing attention to the danger of spitting on the floor	200,000	"
"Instructions for the disinfection of spittoons"	80,700	"
"Tuberculosis," by Doctor Curry Cabral (out of print)	5,000	"
	581,900	

In 1905 the Executive Committee decided to publish an annual placard of a large size, and to distribute it in the schools, working shops, State departments, factories, and companies, in order to promote popular knowledge. The placard was made at Mr. Jorge Collaco's studio, under the supervision of the General Secretary of the Assistance, who composed the instructive part. The lithographic work, done in five colors, was executed at the Ortega House, at Valencia, 20,000 copies being made.

Since the foundation of the society to June 30, 1907, the revenue amounted to $864,782, and the expenses were $458,284.

On June 30, 1907, the general society fund amounted to $659,031. It represents the patrimony of the Assistance, and is composed of the proceeds of the public subscription, initiated on June 11, 1899, the balance between the revenue and the expenditure, of various legacies, the value of movables, immovables, and cattle, not including the ground destined for the Hospital de Repouso, for which there is a special fund.

The Subcommittee of Prophylactic Measures showed well the necessity of making the declaration of the existence of tuberculosis compulsory, not only in case of disease, but also when death occurs. The dispensaries became the principal means of enforcing this measure. By its propaganda,

which united its efforts to those of the National League against Tuberculosis, the advantages of the maritime sanatoriums and of the mountain sanatoriums for the consumptive were shown, and the scarcity of our instruments for the needs of the country was made evident. Thus, if the percentage of beds furnished in Portugal for the treatment of all its consumptives were compared with the mortality caused by the same disease, as was done in Sweden, by order of the Royal Committee, whose reporter was Fixell, our country would require 10,000 beds! How far we are as yet from that number!

Much has Grancher's work been recommended for the preservation of infancy, but, unfortunately, the limited resources of the Assistance prevent this and other of its ambitions from being carried out.

Isolation of Consumptives.

Isolation of consumptives was first done, on request of Her Majesty Queen Dona Amelia, by Professor Silva Amado, then managing the civil and national hospitals of Lisbon, for whose consumptive patients the Arroyos Hospital was appointed by him.

His successor, Professor Curry Cabral, charged with the care of building Rego Hospital for the cure of infectious and contagious diseases, had the main edifice reserved for the treatment of tuberculous patients in 212 beds.

As early as 1900 all the consumptives in the military hospitals were isolated in special infirmaries.

Treatment of Rich Consumptives.

Sanatorium of Seixoso.—It is situated near Lixa, on the Douro Railway, the nearest railway station being Cahide. It was founded by Dr. Cerqueira Magro. Part of the edifice having been destroyed by a fire, it is now being rebuilt.

Grand Hotel of Herminios.—The Sanatorium of Covilhã, at 1630 meters above the sea-level. Its distance from Covilhã is 8 kilometers.

Mountain Pension.—Serra da Estrella, Teixoso, 4½ kilometers distant from Covilhã.

Treatment of Poor Consumptives.

Sanatorium Silva Maia.—Situated at Villa Nova de Famalicão, was founded by Counsellor Antonio da Silva Maia for the treatment of consumptives of both sexes.

Treatment of the Lymphatic and of the Scrofulous.

The Sanatorium of Sant'Anna, at Parede, was founded in virtue of an important legacy left by Dona Amelia Biester. It has its own revenues. This establishment is divided into three wings, each of which can hold 60

beds, for the treatment of poor girls from four to twelve years of age, who are anemic, lymphatic, rachitic, or who have surgical tuberculosis.

The Maritime Colony of the Lisbon Misericordia is destined for the children protected by this institution, and is installed in a house of its own, in the town of Oeiras, at the seaside.

Figueira da Foz.—Since 1906, a Holiday Colony is organized every year at Coimbra, which is near the beach at Figueira, where, for about a fortnight, a few dozens of poor children, of from five to ten years of age, by turns, have a stay at the seaside.

The Colony Rey Collaço.—This has been established at Estoril, for six children.

Assistance to Consumptives.

Oporto.—The Beneficent Group of Foz do Douro.—The Royal Humanitarian Society.

Villa Franca de Xira.—Aid to consumptives, paid for by the well-deserving Mr. Palha Blanco, and medicines supplied by the Assistance.

Laws.

The edict of March 14, 1902, issued by the civil governor of Lisbon, on account of which those who spit on the ground in public places shall be punished, and which enforces the use of public spittoons.

The law of June 12, 1901, reorganizing the services of Public Health and Beneficence.

In consequence of this law, on December 24, 1901, a General Regulation for the Services of Public Health and Beneficence was issued.

According to article 60, all physicians are compelled to give official information to the government health officers about all the cases of death from tuberculosis, smallpox, diphtheria, etc., and are subject to a penalty if they omit to do so.

According to No. 6 of article 74 of the above-mentioned regulation, disinfection is made compulsory when a case of death from tuberculosis occurs.

Regulation of August 30, 1902, with regard to the prophylactic measures against tuberculosis, according to which those who omit to declare that cases of tuberculosis or death from it have taken place are liable to a penalty for disobedience to the law, no matter where the disease was located, and whether affecting the lungs or other organs; ordering the disinfection of rooms in hotels which have been used by consumptive people; prohibiting consumptives from selling food, or being employed in mills, crèches, or schools, etc., and determining a census of all the consumptives existing in the kingdom, to be made with reference to January 1, 1903, which in fact was done.

Regulation for the engineering works at the naval arsenal, which was approved by the royal decree of January 12, 1908, by which, according to No. 1 of article 52, all the clerks and workmen should retire with a pension, even if they have served for less than fifteen years, when they have contracted tuberculosis during their service, and in virtue of it.

DISCUSSION.

Dr. George M. Kober (Washington): It is indeed gratifying to learn from our distinguished colleagues what has been accomplished in the struggle against tuberculosis in Austria, Denmark, Greece, Sweden, Uruguay, Argentina, Portugal, and Switzerland, and we are very much indebted to these gentlemen for the very satisfactory presentation of the subject.

In taking an account of stock of the results accomplished, it may not be amiss to remind you that students of vital statistics have noted a marked decrease during the past forty years in the death-rate from consumption, and this, too, long before a specific campaign against the disease was inaugurated. This is notably the case in England, and in many of our large cities the reduction coincident with the introduction of sewers amounts in some instances to 49 per cent. The only reasonable explanation for this is that sewers prevent pollution of the air and contribute to the removal of dampness by subsoil drainage. The influence of impure air as a predisposing factor to tuberculosis must be apparent when we remember that a cesspool with 18 cubic meter contents is capable of polluting the atmosphere in the course of twenty-four hours with over 19 cubic meters of impure gases.

The relation between dampness of soil and pulmonary consumption was first pointed out by Dr. Bowditch, of Boston, in 1862. Dr. Buchanan, the Medical Officer of the Privy Council of England, in 1867 supplied ample statistical proof that consumption became less frequent in certain towns after they had been sewered and the soil consequently drained. In towns like Salisbury, Rugby, and Worthington the reduction amounted to 49, 43, and 36 per cent. respectively.

It is true that such a marked reduction did not always follow, but in these instances it may be fairly assumed that the soil was previously quite dry and could not be materially affected by increased drainage. The general facts were stated by him without offering an explanation. My personal explanation is that dampness of soils usually means a damp building site, and if this dampness extends to the house, the damp air will abstract an undue amount of animal heat. This not only lowers the power of resistance of the inmates, but also predisposes to catarrhal affections, and these in turn render the mucous membranes more vulnerable to the invasion of the tubercle bacilli.

With this reference to one of the factors which has operated in the reduction of the disease, but which is frequently overlooked, let us briefly review the salient features in the spread and prevention of tuberculosis. It is generally admitted: (1) tuberculosis is an infectious disease caused by a specific organism, transmissible under favorable conditions to even healthy individuals; (2) inherited and acquired predisposition plays an important rôle in the dissemination of the disease; (3) the germs may enter the system by the respiratory and alimentary passages, and by the skin and mucous membranes if there be an abrasion; (4) that while the bacillus has been transmitted through the milk, flesh, and blood of animals and man, the most common and effective way is through the sputum and droplets of tuberculous patients; (5) the habitations of consumptives, as well as their personal effects, clothing, etc., are infected, and liable to convey the disease to others.

Time will not permit me to consider all the measures for the prevention of this disease, but I desire to emphasize a few which may be resorted to by the State in the control of the sources of infection and the diminution of predisposing causes.

1. Compulsory notification by householders to the health authorities as soon as the disease is recognized. This is of vital importance for the control of the sources of infection and for the protection of the family and others. It has been urged that the depressing effect of such information would be too great for the patient, but this will surely be counterbalanced when we inform him that it is, after all, a curable disease, and that his chances for recovery are especially favorable if he does not reinfect himself. The health authorities, apart from distributing proper printed directions for the use of the family and the patient as regards the care, disinfection of sputum, and avoidance of droplet infection, should also resort to disinfection of the home and personal effects of the patient, especially upon vacation of the premises.

2. The enactment and enforcement of laws against promiscuous expectoration and coughing into the faces of persons where the sputum is liable to infect, and provisions for suitable spittoons and their proper disinfection in all public places, are called for.

3. The streets should be sprinkled and swept at night, so as to reduce the inhalation of germ-laden dust to a minimum.

4. The supervision of the sanitary condition of factories, hotels, theaters, churches, schools, ambulance service, sleeping cars, etc., should likewise be under the control of the health department, and house-cleaning should be accomplished as far as practicable by the vacuum system.

5. Marriage with a tuberculous person should not only be discouraged, but absolutely prohibited by law. A tuberculous mother should not nurse her infant, and in the selection of a wet-nurse a certificate of health should

be demanded. Isolation of tuberculous patients should be insisted upon in hospitals, asylums, and public institutions. In private life the patient should occupy at least a separate bed, use separate eating and drinking utensils, and neither receive nor give kisses.

6. Government inspection of dairies and of dairy and meat products and the extermination of bovine tuberculosis are urgently called for. The writer has tabulated 86 cases of milk-borne tuberculosis, 3 accidental inoculations of men by the local application of cream and milk, and 12 tuberculous wound infections among veterinarians and butchers. According to Dr. Salmon, during 1900 of 4,861,166 cattle inspected in the United States, 5279, or 1 in 921, were tuberculous; and of 23,336,884 hogs, 5444 were sufficiently affected to cause condemnation of some part of the carcass.

The possibility that the germs of tuberculosis may be conveyed by means of flies and dust suggests that greater precaution be exercised in the exposure of food-stuffs in show-windows and in the open air.

The Duties of the State in Diminishing the Predisposing Causes to Consumption.—Having considered the sources of infection and the indications for their control, it is well to remember that, in addition to the germ, there must also be a suitable soil for its growth and development. Such a soil is usually found in persons of feeble physique, victims of malnutrition, whose vitality has been lowered from any of the numerous causes which are afloat, whether it be in a previous attack of sickness, dissipation, vicious habits, insanitary houses, lack of pure air, sunlight, and proper food.

Reference has already been made to the good effects of sewers in preventing air pollution and in the removal of dampness by drainage. When we remember that only about 30 per cent. of the population in the United States live in sewered towns, and about 41 per cent. live in towns having public water-supplies, we see at once the necessity that a system of public sewage must go hand in hand with the public water-supply.

Insanitary Dwellings.—Tuberculosis is far more prevalent in dark, damp, and insanitary houses. The death-rate is often double and treble that of other localities. While there are doubtless other factors which determine the frightful mortality, none are more potent than deficient sunlight and ventilation. The tubercle bacillus clinging to floors and walls in carelessly expectorated sputum or droplets would be destroyed by a few hours of sunlight, but finds in damp and gloomy rooms suitable environment for its vitality and growth, and other insanitary factors vastly increase the susceptibility to the disease.

For all these reasons I consider the condemnation of houses unfit for human habitation, and the substitution of sanitary houses, only second in importance to the destruction of the germs. The State may not be in position to provide the sanitary homes, but it can at least insist upon regulating

the construction and amount of air space, light, heating, and ventilation of dwellings offered for rent. The State should also interdict the erection of tall buildings, and of all buildings covering over 66 per cent. of the lot, since they shut out light and air, thus destroying the very object for which broad streets and avenues were created, and bringing us back to the insanitary era of the medieval towns, with their narrow and winding streets.

Physical Culture, Public Playgrounds, and Baths.—The State should pay attention to the physical development of our youth, and this is best accomplished by proper training, preferably in the open air in the public schools and playgrounds. The children of consumptives require special attention because of the transmission of vulnerable anatomical elements which render them peculiarly liable to the disease; this predisposition can certainly be overcome, in addition to proper food, by pure air, methodical gymnastics, and systematic hardening of the skin secured in bathing. No school should be without these hygienic advantages. No effort should be spared to increase the resisting power of the individual. Indeed, we are altogether too apt to underrate the question of soil or predisposing factors in our crusade against the disease.

Factory Sanitation.—It has also been shown that a vulnerability of the tissues to the disease may be acquired by dust-producing occupations, and here the amount of dust seems less important than the character of the particles which compose it. For this reason, no doubt, the hard, sharp, and angular particles of iron- and stone-dust are more liable to produce lesions of the respiratory mucosa. There is abundant statistical material to indicate the influence of dust-producing occupations as a predisposing factor to tuberculosis and other pulmonary diseases, and it is clearly the duty of the State to formulate efficient laws in regard to factory sanitation and the occupations in general which are injurious to health.

The Duties of the State in the Treatment of Tuberculosis.—It is certainly the duty of the State to see that every patient who has no home, or whose environments offer less favorable conditions for his recovery, is provided with proper care and shelter.

It may be truly said that hospital treatment of consumptives offers the best chances for recovery and the ultimate extermination of the disease, and until a comprehensive system of industrial insurance has been adopted, the State must shoulder the responsibility in the case of patients unable to bear the financial burdens. Every city of any size should provide facilities for the isolation and proper treatment of the patients, supplemented by general State sanatoriums. Since identification of the disease is the first and most important step in treatment and prevention, the establishment of dispensaries for the recognition of incipient cases among the dependent classes seems urgently called for. Such dispensaries should become the

feeders for municipal and State sanatoriums, and when properly conducted will be a most important factor in the combat against tuberculosis. In all such cases it is desirable to sift charity from abuse, and it devolves upon the State to determine the financial condition of the applicant and prevent destitution of the family while the bread-winner is incapacitated for work. It is also the duty of the State to suppress quackery, for no class fall more readily a prey to unscrupulous mountebanks than our consumptives.

The Federal Government is already performing an important duty by exercising a watchful care over the subject of tuberculosis among animals. The preventive measures urged by the Bureau of Animal Industry are of far-reaching significance, although primarily intended to protect the pocket-book of our farmers and stock-raisers. Large sums are annually and very properly expended to quarantine our seaports against cholera, yellow fever, and smallpox, because these diseases, if permitted to gain a foothold, occur in epidemics, are rapidly fatal, and hence strike terror into a community; and it is to be hoped that similar opportunities will be afforded to the Public Health Service to cope with tuberculosis, which claims more victims than all these diseases combined.

In the actual care and treatment we also have a right to expect a more active participation on the part of the Federal Government. It is a notorious fact that thousands of helpless cases of consumption are annually dumped upon States and Territories which have become famed as health-resorts, and the hospitals, sanatoriums, and almshouses of the Carolinas, California, Colorado, Arizona, and New Mexico, are filled with indigent dying consumptives.

It is claimed by Mr. Frank D. Witherbee, in "Charities," November 6, 1904, that in Phœnix, Arizona, public and private charity is taxed to the uttermost, and that three-fourths of the money expended on the inmates of the almshouse goes to alien consumptives.

It is cruel and worse than useless to send a consumptive away from home without sufficient means to secure the ordinary comforts and advantages of climatic treatment, and the Federal Government should not tolerate it; but until this is accomplished, the Public Health and Marine Hospital Service should be authorized to study the problem, which studies may form the basis for a more permanent and enlightened amelioration of this unfortunate class of victims.

It is very evident that the great problem which confronts most of our sanatoriums to-day is, what shall be done with the class of indigent patients whose disease has been arrested, but who need suitable employment and surroundings for their permanent recovery. While it is hoped that the opportunities of a coöperative system will broaden out in time in connection with the State sanatoriums, it cannot be denied that certain sections in

the far west offer suitable advantages for a permanent cure, and the question arises whether the Federal Government would not be justified in engaging in extensive live-stock raising to give employment to young men of this class. The government needs horses and mules, beef and mutton, butter and dairy products for the public services. It has many valuable reservations susceptible of cultivation, with or without reclamation, and there is no good reason why such farms should not prove self-supporting.

The results of the government sanatoriums for consumptives at Fort Bayard, Fort Stanton, Fort Lyons, Colorado, have been so gratifying that substantial and permanent results may be hoped for by an expansion of the system to at least the civilian employees of the government along the lines indicated, or possibly by the establishment of colonies for arrested cases.

Dr. Peter H. Bryce (Ottawa) expressed his pleasure in listening to the complete summary given by Dr. Kober. We have to deal with three factors, namely, the germ, the environment, and the patient. Dr. Kober has pointed out how England has succeeded in reducing the mortality by removing the dampness of the soil by drainage, improving the general sanitary conditions, and by instituting meat and milk inspection. Nevertheless, Dr. Bryce expressed his firm conviction that the chief factor lies in the proper sanitation of homes. In his department he has control of the Canadian Indians, among whom the death-rate, ordinarily from 20 to 25 per thousand, has reached the enormous figure of 86 per thousand. These Indians had been sent to the Rocky Mountains of Canada, where the rainfall amounts to 10 to 14 inches per year, where, therefore, the climate may be considered perfect, as regards dampness, etc. Yet these Indians, living in such a perfect climate in small huts, have shown a death-rate of 50 per thousand from tuberculosis. The danger from meat and milk is eliminated, since the cattle of that region are not infected with tuberculosis and Indians do not use milk. The Indian is in his cottage from October until May, therefore everything is eliminated except the box in which he lives. Now, if the Indian's hut can be taken as an example, we have the explanation of what must be done in our cities. The same is true of the Italians in New York city who come from a life in the open air in Italy to live in unsanitary homes, with a consequently high death-rate. Dr. Bryce therefore concluded that the chief object to be attained is house inspection, and that municipal control is to be regarded as the explanation of the cause of the reduction of the death-rate from tuberculosis in England.

Dr. Cheney (Connecticut) described a movement in the State of Connecticut which he thinks is new and deserves special attention. This is called the "workingmen's free bed fund"—a movement started by a man who came from the ranks of the workingmen. The workingmen raise funds, consisting almost entirely of small contributions, which are used for the

establishment of free beds and for the care of advanced cases who cannot care for themselves. The movement has spread to other cities of Connecticut.

Dr. Thornton (Memphis, Tenn.) expresses his belief that too few of our States have done enough in the matter of providing sanatoriums for those patients who are unable to provide for themselves. He discusses the death-rate among the negroes and whites in his State, particularly among the class who cannot care for themselves, and reached the conclusion that sanatoriums would be of great benefit, since they would care for these patients, thereby removing them from the community and decreasing the danger of spreading the disease, and also would serve as educational institutions.

Dr. Bullock (St. Joseph, Missouri) expressed his belief that his home city is one of the most healthful in the world. The reason for this he believes to be found in the fact that the streets of his city are not swept, but are thoroughly flooded with a hose, thereby avoiding street-dust and danger of infection from it.

Dr. Sansom (Memphis, Tenn.) considered the chief source of infection with tuberculosis to be the huddling together of people in unsanitary dwellings. He discussed the condition among the negroes of the south, who lived before the war in good dwellings, ate proper food, and breathed pure air. Within a few years after the war tuberculosis developed suddenly and became most virulent, because of the huddling together of the negroes in ill-ventilated dwellings. He concluded that the chief duty of the State should be to aid in destroying these channels of infection.

Dr. Ulloa (Costa Rica) expressed his belief that house inspection is the most important way to attack the disease. He believes that the same result with tuberculosis can be attained as has been attained with yellow fever. A second important consideration is the compulsory notification of cases. We must treat tuberculosis as we treat other infectious diseases and adopt more strenuous measures.

Dr. Eduardo Liceaga (the Delegate from Mexico) agreed with Dr. Bryce that the most effective manner of combating the disease is by house inspection. He considered further the measures which are to be taken to prevent infection in public places, such as railways and steamships, and proposed that the companies be compelled to provide portable cuspidors.

Dr. Hodgetts (Toronto) expressed his pleasure in hearing from Sweden that the State had taken the lead, and had thereby taken the work out of the hands of charity organizations. The State should not assume the entire charge, but should divide the responsibility with the municipality. The State should provide sanatoriums for those unfortunates who cannot provide for themselves, and should further aid by funds all institutions engaged in the work against tuberculosis, recognizing that they all have their distinct field of work.

Dr. Lewis (Virginia) expressed his conviction that the time has come when the State and municipality must take control. He noted the necessity of State action in the supervision of the construction of prisons and the isolation of tuberculous convicts. School buildings should also be watched over by the State, and no school building should be built without an air-supply of at least 250 cubic feet per scholar, as the law in Virginia now requires. He agreed with former speakers that the cause of the enormous death-rate from tuberculosis among the negroes is their crowding together in ill-ventilated houses.

Dr. Medina (New York) believed that while a great deal has been accomplished, our only hope lies in the education of the general public, not so much of the old, as of the young in the public schools. He thought that the physicians assigned to the public schools should examine pupils for tuberculosis, and that tuberculous pupils should be excluded and followed up by proper officers, and cared for.

Dr. Menville (Louisiana) explained that before the war it was in the interest of the owner to keep his slaves in good health, therefore a physician made biweekly visits. To-day there is no such provision. The negroes live in overcrowded conditions, spend their money in gambling, eat poor food, and clothe themselves poorly. He further emphasized the fact that when a group of medical men go before our State legislatures, asking that some measure or other be passed, the legislators become suspicious. We must, therefore, begin by first educating the legislators. His State has a commission which sends out men to the different parishes, who hold meetings of health officers and others interested, in an attempt to educate the public, and through the public the legislators.

Dr. Heiser (of the Philippine Islands) closed the discussion. He believes that three facts stand out as a result of the opening session: (1) that tuberculosis is a house disease, a disease of civilization; therefore, (2) uniform legislation preventing overcrowding must be instituted and (3) an educational campaign must be begun.

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

SECOND SESSION.

Tuesday Morning, September 29, 1908.

STATUS OF THE TUBERCULOSIS CAMPAIGN IN VARIOUS COUNTRIES (*Continued*).

Section VI was called to order by the President, Surgeon-General Walter Wyman, on Tuesday morning, September 29th, at half-past nine o'clock.

THE PROBLEM OF TUBERCULOSIS IN CUBA.

By Dr. J. L. Jacobsen,
Havana.

The problem of tuberculosis, considered in its general lines, may be said to be the same in Cuba as in any other country; the disease shows the same evolution, clinical varieties, and is due to the causes known everywhere else.

It will be understood, of course, that we refer to the social problem: the conquering remedy* that would naturally change the terms in which that problem is actually conceived, and which would fix conditions as regards cure, has not as yet been discovered. Tuberculosis is avoidable and curable at any period, and if we do not command a sure agent of cure, we have indirect means of proved efficiency. It is a natural and practical method which has as its only base the observance of a simple hygiene and is easily adapted to the life of the citizens. With airy, clean, and spacious dwellings, good food, and adequate exercise, a man will doubtless offer greater resis-

* Ch. Cornillot & J. Montelli, Prophylaxie de la Tuberculose en France par l'education sociale. (2 Congrès d'Education Sociale, Bordeaux, Septembre, 1907.)

tance, and will command, in case of infection, natural and energetic means of defense.

It is not our purpose to describe a general prophylactic plan, nor to discuss the value of diverse methods which constitute the social treatment of tuberculosis, prophylactic and curative at the same time.

The problem in Cuba presents some points that should be mentioned. Primarily, regarding the etiology of the disease, there is a new factor to be reckoned with, and which depends on the tobacco industry. There are many cigar and cigarette factories distributed throughout the island. Referring merely to the capital, where the majority are located, the sum reaches up to 140 (100 cigar factories and 40 cigarette factories), employing 15,000 men and 5000 women. We have not yet complete statistics allowing us to compute the number of cigar makers suffering with consumption. However, the following figures may be examined; they are the only ones I was able to gather. In statistics presented by Dr. Ortega covering 1486 consumptive patients from several hospitals, the Tamayo Dispensary, and the north and south districts of the city up to the year 1902, it can be seen that the occupations are distributed as follows: 116 cooks, 131 masons, 214 clerks, 236 peddlers, 91 office clerks, 179 without gainful occupation, and 285 cigar makers—the last class furnishing the largest number. At the dispensary of the League, out of 588 patients, 168 are cigar makers—also the largest number. Dr. Rensoli, of the Dispensario of Sanidad, has furnished me with the following data: out of 676 patients, 96 are cigar makers, and in a group of 225 patients employed in housekeeping there would surely be found a good many more. Undoubtedly, the industry is carried out under bad conditions; the factories, excepting a few, are not built for the purpose, and the cigar maker works in a close atmosphere. "If a factory is visited during working hours, a disagreeble impression is received by seeing the agglomeration of workingmen of all ages; when going into the place, a heated fume or vapor, impregnated with a strong odor of tobacco, is felt. In the city of Havana, we do not hesitate to say, one of the main causes favoring the frequency and increase of tuberculosis is to be found in the defective conditions prevailing in the cigar industry."* How does the cigar maker become a consumptive? We have asked ourselves this question more than once, and though we believe that the disease in those foci is due to common causes,—darkness, dampness, and lack of ventilation,—yet consumption is so frequent among the cigar makers that we have asked ourselves whether tobacco might exercise some specific action on the development of the disease. Dr. Davalos and myself have gone into a series of experiments which, so far, do not allow us to set forth a conclusive answer,

* Article "Tuberculosis," in the Sanitary Manual (Manual de Sanidad), Habana, 1903.

which, however, we present in a separate paper to this Congress. The cigar maker, as a rule, is a sick man. With a little experience one can easily recognize him. He is a thin, pale, weak, and sad-looking man. Usually his appetite and digestion are poor. Before becoming a consumptive his functions gradually lose their normal energy. In many of the cases examined by Dr. L. Plasencia the hematologic examinations show the formula of chlorosis.

"It is a well-known fact that young men with a predisposition to the disease, and even those without such a tendency, will contract it sooner or later at the cigar factories. There are few who are able to spend several years at the workshops without visible injury to their health. Havana, having in its center so many factories, is a focus which seems to be inexhaustible. Let us now compare the statistics of tuberculosis in cities having cigar factories and those that have not. Instances of the first class are the following: San Antonio de las Baños, Bejucal y Santiago de las Vegas, unhealthy places wherein tuberculosis is more frequent.

"These unsanitary conditions are due to non-compliance with the rules provided by the Board of Health (Junta Superior) for the hygienic regulation of the industry. Even in the few factories built for the purpose there is a noted lack of ventilation, light, and space for the number of workmen employed. The Board of Health, in its sanitary regulations approved and enforced by the Government, ordered, among other things, that the cubic area for each workman should be not less than twenty cubic meters; and in a report I presented to the Board of Health, by reason of an appeal filed by the proprietor of a factory against such regulations, I suggested that in workshops sufficiently ventilated said standard of cubication could be lowered, but for those dark and badly ventilated workshops so common at the cigar factories in Havana the standard should be maintained. As I have said, in the majority of workshops the air is not changed, the claim being made that the current of air dries the tobacco leaf and damages the product. But this is not so. I have seen the manufacturing of cigars carried out in open, spacious, airy departments or halls, which, by the way, are rarely found in the cigar factories of this city. I refer to the wrapper rolling department, in which there should and can be an adequate ventilation, without at the same time drying the tobacco. At the selecting departments (escogidas) the ventilation can be increased. On the other hand, the stripping and outstripping departments should be more protected from the air by locating them in proper halls wherein the workingmen in smaller numbers may dispose of a larger cubication as compensation for less ventilation. Leaf tobacco in bales must be kept in closed rooms. I cannot recommend a uniform system of ventilation to be applied to all workshops in Havana, as their construction and arrangement differ. The ventilation

ought to be permanent, but effected gently, in such a way as not to be noticed.

"The cigar maker is in need of more protection than others, for in the practice of his trade he exposes his health, which in the greatest number of cases is irreparably damaged. For this reason the Frenchmen have classified it among the unhealthy trades. I am of the same opinion, and have recommended as an addition to the regulations now in force the following: First, to prohibit the erection of new cigar factories within the limits of the city; second, to prohibit repairs or changes in construction in the factories now existing within the city limits which may tend to make them more durable."* In ventilated workshops the standard of space may be lowered; and the sanitary engineer shall fix it for each workshop in accordance with their shape and arrangement, after convenient and continuous ventilation is secured. The important point is to establish in every department a simple and adequate system of ventilation, and to regulate the current in such a manner as not to hurt the workingmen nor to injure the tobacco leaf, while making sure that a breathable atmosphere is obtained. If it were desirable to examine the air, we might ultimately fix the degree of purity of the atmosphere and finally regulate the plan of ventilation.†

Among the cigar makers it is very frequent to meet with consumptives, but cases produced by alcoholism are very seldom found. This is a peculiarity of the problem of tuberculosis in Cuba. Alcohol is certainly a cause of tuberculosis in every country, and it is so in Cuba, but in a very small proportion. While in foreign statistics alcoholism occupies a prominent place in the etiology, in our country the cases of tuberculosis due to that cause are very few. In my practice I have seen it very seldom, and this is clinically explained by one of these two facts: That the Cuban, as a rule, is not an alcoholic, and that here the complications in the lungs are not so frequent. Therefore we cannot apply to Cuba Clemenceau's expression, "Alcohol is often the conveyer and always the accomplice of tuberculosis."

Among the causes local to our country we must also mention the linen-ironing trade. In our laundries clothes are still pressed by hand, and the work is intrusted to Spanish young men, who very often contract the disease; washerwomen who iron clothes become consumptive very frequently, and this is the reason why it is difficult to find women for this trade. The workingman gets too much fatigued, and to these causes we may add the bad conditions under which the work is done—the heated atmosphere, bad ventilation, and exposure to sudden changes of temperature.

There are many stores where it is still common for clerks to sleep, and

* Article "Tuberculosis," loc. cit.
† Report presented to the Board of Health, Habana, 1907.

which have not the proper conditions for the purpose, as they are badly ventilated and overcrowded, with scarcely sufficient space for storing the goods.

I will not mention other common causes of tuberculosis, as I do not intend to present a complete study of prophylaxis, but merely to indicate the prominent points affecting the Cuban problem, on what basis it stands, and how the problem can be solved most effectually. At a glance we see that this problem, by reason of its wide scope, the numerous social questions involved, and the interests concerning the community, is complicated and difficult to solve.

The organization of the tuberculosis public services in Cuba dates from the period of the first American intervention, in 1899, the foundation of the League in 1902. Before these dates no measures of a prophylactic nature had been officially tried. The problem of tuberculosis had not yet reached under the government's scope, and was limited to therapeutic formulæ and advices given by the physicians to their clients; to the removal of patients to foreign sanatoriums, or the returning of others to their mother-country by regional beneficial associations (Sociedades de Beneficencia Regionales); and to the regular course of treatment at hospitals, etc. Medical literature was poorly supplied with works on tuberculosis. Among such works the death-rate statistics of Dr. A. Gonzalez del Valle are worth mentioning.

The Board of Health was created at the time, and the department was established, including several divisions, among which are those of tuberculosis, statistics, and disinfection. The special dispensary for thoracic diseases was founded, hygienic regulations were prescribed for use at the cigar factories, and those prophylactic measures more urgently required were put into practice and gradually applied. The sanitary regulations, actually in force, were prescribed, and ultimately a sanatorium for the poor classes was located near Havana. The League's advice was asked for, and as a private association it developed the propaganda announced in its program. A monthly publication or bulletin was established, and, taking advantage of its representation before the Board of Health, the League presented plans and reports tending to improve and enlarge the actual organization of the tuberculosis public services.

A large amount of information has been gathered on which a more useful system of prophylaxis could be established. The work established by the health department and that carried out by the League itself are deficient. The problem is known in its different phases, but it is only half tried, in an incomplete and ineffective manner.

As soon as the League ceased having official protection, its work had not the same efficiency. Fully convinced that private associations in Cuba

could not progress, I declared to the League from the start that it ought to have official protection in order that its efforts might be effectively directed. I do not deny that some good has been done, but it is not worth comparing with the time employed, nor with the exertions that have been made. Its bulletins show the whole of six years' work—a lapse of time more than sufficient to achieve some results; and instead of advancing on the ground conquered at the start, when the League met with help in its efforts, its influence was gradually weakening, the number of members decreasing, and to-day the personnel to carry on the work is very small. If it should happen that the League should lose its scant income (almost all of which comes from official sources), it would then be obliged to restrict itself to a small propaganda, which, for all that experience shows, will be fruitless. There are other associations in Cuba similar to ours, dependent on public charity and directed by men of good-will, who are endeavoring to raise the moral level of society and to afford some comforts to the poor classes. Among such associations there is one worthy of special mention because of the good results obtained, and for its intelligent and clever management under Dr. Manuel Delfin. This association is named "The Poor Man's House" (La casa del Pobre), but their sphere of action is very limited and the struggle hard.

Private associations, in Cuba at least, and our League among them, have not been able to carry on by their own efforts really profitable work of education. A social work of this scope must be backed by resources larger than those of private associations, public charity, and even municipalities; it must be supported by the State. The same is true in France, to quote several writers on the subject; the work is started with great enthusiasm, zeal, and intelligence, and it is maintained in the same manner, but the results do not always compensate the exertions. On the other hand, there are other nations in which the State assumes the responsibility and develops its activities within an organization well conceived, the results being brilliant, and followed by a reduction in mortality. England and Germany are in this class. England endeavors, above all things, to improve the life of the working man and to render his dwelling healthy. Germany removes all probable causes of infection, and sets up for this purpose numerous sanatoriums supported by the patients themselves.

In the United States there is an exception to this rule: the feelings of charity and beneficence are so well developed there that the private associations become practical and useful organizations, and, as far as the tuberculosis problem is concerned, they powerfully reinforce and round out the State's action. Both are powerful initiatives working together, and present a vigorous system for the treatment and prevention of tuberculosis, the results of which are more and more gratifying. It is not surprising that

public health in that country derives so much benefit from private activities if the latter, being one of the nation's living forces, organize and daily maintain numerous institutions which enable almost all the large centers of higher education to progress and spread, while in other countries they are supported by the State. This fine accomplishment is the result of social solidarity, and represents a remarkable sign of culture and prosperity.

It is not possible, with our deficiencies, to hope for the application of such elements to the solution of the tuberculosis problem in Cuba.

The tuberculosis public service in Cuba is in charge of a section of the health department, under the direction of a medical chief, who attends to the business of the office and to the inspection of all the services. A census of tuberculosis in Havana is kept by means of compulsory reports of new cases and deaths, furnished by the physicians, and disinfection is done in case of death or change of residence. This section is charged with the following items: The inspection of cigar factories; the service of the dispensary under a medical director and two consulting physicians and inspectors; and a public sanatorium with a director, who is at the same time resident physician.

Furthermore, there are under the same department the disinfection and statistical sections, which work separately. These agencies, as already stated, improve the tuberculosis service. The inspector's section does good work for the tuberculosis section, but even so, it can be said that the results accomplished by each of these sections are not satisfactory, first, because the government does not give them an adequate appropriation; and, second, because they are not organized, nor can they be. Before the Board of Health I have repeatedly asked for the decentralization of these different sections, thereby giving to their respective chiefs a greater sense of responsibility and greater authority; besides this, the work would be easier and more speedy. Each of these sections should have more power, and the work of the department of tuberculosis could be enlarged by assigning to it the work of inspection, disinfection, and statistics relating to tuberculosis. It is possible to have, and there should be, different sections or divisions to take charge of the general services of the department, but the tuberculosis section should have charge of its own services.

The statistical section deserves foremost attention. Statistics are the key to the problem which we are studying. The gathering of statistics is the starting-point, the foundation on which are based the study of the disease, of the patient, the place where he lives, his state or condition, and his social status, etc.

It is important to know the number of deaths, but it is also important to know the number of living consumptives. We should not only make

a record of those that depart, but also should take note of those that remain. We ought to outline the history of the large consumptive family with all its elements, including the young ones, who in many cases begin to form part of it insensibly; the element in that group which we might call adult, for its characteristic features are already well marked; and, lastly, those older cases which, by reason of their advanced stage, are being gradually discarded. Tuberculosis claims so many victims in such a nation; it is so frequent in such a city, etc.; but are the cases evenly distributed or concentrated in certain quarters ? To what social class do the victims belong and how do they live? How long have they been sick and how was the disease contracted? Are they in condition to be cured, and what means do they spend for that purpose? etc. The preceding questions affect the social problem and ought to be answered. Medical inspectors would be the best agents for gathering the statistics; and the offices, well organized, the best centers of information. Clinically, the diagnosis is the most important decision reached. Without it the proper warnings cannot be given and rational treatment is not possible. That is why a good diagnosis is of so much importance. Similarly, statistics play a large part in the study of tuberculosis. Carefully and fully practised, the problem of tuberculosis seems solved in its principal parts at least. Statistics play the same rôle that diagnosis does clinically—the essential judgment. What remains to be done is to use the methods which these investigations point out. A case is discovered, and a second, and a third, not for the purpose of securing statistical data, but with the desire of knowing the patients and fixing the means to avoid or to attack the disease; in short, prophylaxis and therapeutics. If the diagnosis has been made, or, in other words, if the statistical work has been done correctly, that will be the result. Great efforts, therefore, ought to be employed to compile reliable statistics in order to know where the patients are, the infected districts, the towns more or less attacked, all of which serves to show how to render those places more healthy and to point out where the patients can be removed.*

The chief sources of information for reliable statistics are two: compulsory reports of cases and the dispensary. Reports which, as Van Ryn says, are the basis of a general prophylaxis are not, however, compulsory everywhere. They are in Cuba, but the result is not fully satisfactory, and it is easily understood. Physicians have assumed one more obligation, and they may fail to do their duty without there being any possibility to compel them to fulfil it exactly. Why not induce a good will to serve the State? I believe it would give good results to offer some annual prizes to such physicians as

* Importance of Statistics in the Problem of Tuberculosis, 1904 (Bulletin of the League).

would report the largest number of cases, or, as is done in some cities in England, to offer a small sum for each consumptive case reported, after having been duly verified.

The dispensaries would also be of great assistance in this work. By reason of their organization they ought to be considered as centers of statistics, as it is their function to verify and classify the cases recorded. It is necessary to increase the number of these centers and to establish one at least in every city of the island, although their organization at first should not be definitive. Lastly, as a complement of this work, a kind of census of cases of tuberculosis might be taken once or twice a year. The blanks should be distributed at the residences, to be filled out by the head of the family.

I believe I have proved with these few data the necessity for immediately establishing a statistical center, generously endowed and duly organized, so that it may have all the powers of an inspection and information office, whose results will be really practical and useful. Thus considered, the most favorable solution of the different phases covered by the problem of tuberculosis would be known. Inspection would let us know the origin of tuberculosis among families, the life of the poor in inadequate dwellings and in our tenement-houses (ciudadelas), their sufferings and privations; and the statistical data, strengthened by an able medical inspection, would make evident the wisdom of making a complete reform in the dwellings occupied by the poor, and of helping them in their urgent needs (food, shelter).

A few years ago I presented, at a meeting of the Board of Health, a plan for the building of a hygienic tenement-house for workingmen, made by the engineer, Mr. Toraya, at my request. It seemes to us so adequate and practical for the purpose of solving one of the most serious points of the prophylaxis of tuberculosis that we have had a model made which I have brought before this Congress—an exhibition of a house built on a strictly economic and hygienic plan.

Thorough inspection of workshops, public stores, and food-stuffs would also reveal numberless abuses which endanger health, and would indicate the reforms required for each case.

The inspection of schools will accomplish a mission of the utmost importance, up to the present unknown in Cuba. The department inspects the schools, takes care of vaccination, examines the eyes of children, provides regulations to check the spread of contagious diseases, and the Board of Education undertakes to provide hygienic buildings for the schools, and has already established the teaching of hygiene in all of them. This is all very good and sound, but it is not enough. The complete inspection of

children is not practised rigorously. There do not exist statistics showing the number of consumptives among the school population.*

Professor Grancher has proved that in the schools of Paris tuberculosis attacks children in a proportion of 15 per cent., while we do not know what the rate is in our schools. The doctor, in his inspection of the school, is required to make a systematic examination for morbid tendencies, and particularly for incipient tuberculosis.† A child suffering with consumption cannot follow the school life and is a danger to his schoolmates. The early diagnosis of consumption in a child allows us not only to prevent the spread of the disease, but also to give him proper treatment.‡ We shall not insist longer on the extreme importance of this matter, nor have we time now to discuss the necessity of establishing a careful watch over the health and development of children in school. It is necessary to insist on the teaching of hygiene as a part of the child's education, and it is also required to organize the medical inspection of the schools in a more accurate manner. I will not now fix my attention on the best methods of doing that work, its limits and its scope. I will merely recall what I have recommended to the Board of Health. Medical inspectors should be appointed for that exclusive purpose, and I am pleased to see that same affirmation is made by Dr. Willis Brend before the International Congress of School Hygiene.

In the last twenty years it has been understood that the best formula of protection of the adult against phthisis lies in the systematic protection of the first age and infancy; that is, in the preparation of a ground of resistance for the future.§ This inspection, if well practised, would report the condition of children in the schools. We should be informed of the number of the sound and the sick ones, and it would be naturally more easy to determine what ought to be done for the benefit of the latter, and would bring about the creation of special open-air schools, vacation colonies, etc. In this point, also, statistics with their systematic information would do a most important work.

* The School population of Cuba (ages between five and fifteen) in May, 1908, was as follows:

	Males.	Females.
City of Havana	7,727	7,814
Havana Province	16,898	15,573
Oriente	13,407	12,603
Matanzas	9,071	8,680
Sta. Clara	16,733	14,236
Camaguey	3,656	3,395
Pinar del Rio	9,065	6,059
Totals	76,557	68,360

† Lecture of Sir Lauder Brunton, Second International Congress of School Hygiene, London, 1907.

‡ Ch. Cornillot and J. Montelli, loc. cit.

§ Ch. Cornillot and J. Montelli, loc. cit.

But to make these agencies effective, it is necessary to provide ample resources, a complete and competent corps of officials, and recognize its importance and authority; and all this is the duty of the government.

On the other hand, the labor of gathering statistics would be relatively easy in the republic of Cuba, by reason of its geographical condition, its isolation, small population, and the concentration of this population in the important cities and towns, which would make it possible to count accurately the number of consumptives, and to know every one leaving or entering its territory. In the problem we are studying prophylaxis is not the only consideration. The sick must also be attended to, and this is the function of the hospital, the sanatorium, and the dispensary. It is necessary that advanced cases of consumption among the poor be made the object of more consideration and protection. Just now a strange regulation has been enforced, providing that such cases shall only be admitted in the hospitals existing in the capitals of the provinces and in the city of Cienfuegos.

Regarding sanatoriums, the only sanatorium for the poor has recently been opened in Havana. It is necessary, in my opinion, to establish more of the same kind in the interior of the island, and at the same time to foster and stimulate the creation of private establishments of the kind in some of the many places in the island wherein a large number of patients would surely find relief or cure without being obliged to leave the country.

All this work, of course, is slow and complicated. We are aware of that. We do not expect to see it realized in one day, nor in one year; but we believe that it is possible, and it should be founded on better conditions, in view of the small means at our disposal at present to fight tuberculosis, and the little efficiency shown by private associations. Tuberculosis does not diminish. On the contrary, the statistics in Cuba show that the proportion of mortality is on the increase. (See Tables A and B.)

The solution of the problem of tuberculosis is a government function, and to the government belongs the obligation to start, to organize, and to direct the same. The government has in its hands the necessary means, and does not lack the resources, which, after all, might not be so great as it might appear at first sight, the magnitude of the enterprise taken into consideration. Well developed, the antituberculosis problem is a problem of general hygiene, and in the end an economic work. To support this assertion it is only necessary to think of the number of useful lives that the disease takes away every year from all nations.

The State ought to protect the life and property of the citizens; ought to come to the defense of the poor and to the assistance of the sick, or, as Professor Grancher puts it, the living and the sound ones have a right to the protection of their life and health, which constitute a property as worthy of

TABLE A.—MORTALITY IN THE CITY OF HAVANA FOR THE LAST EIGHT YEARS.

1900	851
1901	900
1902	949
1903	1027
1904	1161
1905	1179
1906	1153
1907	1176

TABLE B.

Provinces.	1902.		1903.		1904.		1905.		1906.		1907.	
	Pulmonary Tuberculosis.	Other Tuberculosis.	Pulmonary Tuberculosis.	Other Tuberculosis.	Pulmonary Tuberculosis.	Other Tuberculosis.	Pulmonary Tuberculosis.	Other Tuberculosis.	Pulmonary Tuberculosis.	Other Tuberculosis.	Pulmonary Tuberculosis.	Other Tuberculosis.
Pinar del Rio	418	40	289	34	328	45	320	48	320	55	348	74
Habana	1357	152	1427	147	1511	143	1540	182	1483	187	1512	231
Matanzas	574	80	555	70	549	77	538	72	526	93	508	78
Santa Clara	690	63	659	76	686	66	655	97	710	89	672	124
Camaguey	121	19	104	23	82	15	114	28	95	14	113	22
Oriente	442	46	406	58	389	67	442	65	426	94	425	81
Total	3602	400	3440	408	3545	413	3609	492	3560	532	3578	610
Grand total of deaths	25,512		23,982		25,198		27,345		30,021		34,000	
Rate per 1000 do.	141.18	15.67	143.44	17.01	140.68	16.39	131.98	17.99	118.58	17.72	105.23	17.94
Rate per 10,000 inhabitants	18.01	2.00	17.20	2.04	17.72	2.06	18.04	2.46	17.80	2.66	17.89	3.05

respect, at least, as a title of rent or a house. And the consumptive, for his part, has also the right to ask the State: "Can you admit me to a special establishment where I cannot be of any danger to the rest of the people and wherein I can be taken care of?" (Bouchard). The municipality and the province might contribute to the work, and even the poor classes, in their own behalf, might bind themselves to organize insurance associations against the disease which would furnish important resources. Be it sufficient to recollect that this method, adopted in Prussia in 1884, is the basis of the system organized in that nation against tuberculosis, and that the reduction of mortality noted in that country is principally due to this organization. The private associations would coöperate with the government as auxiliaries, and, provided with the protection and influence which they do not enjoy at present, their action would be most fruitful.

We have pointed out every particular. To design a plan of work would be easy. The only thing needful for success is an earnest pledge to fight

tuberculosis, a determination to carry on the fight with as much energy as has been shown in that against yellow fever.

Let us hope that the Government of the new republic will recognize all the importance of the tuberculosis problem and attend to its solution with the necessary means.

El Problema de la Tuberculosis en Cuba.—(JACOBSEN.)

El problema de la tuberculosis, es el mismo en Cuba que en otros paises, considerado en sus lineas generales. La tuberculosis abedece aqui á iguales causes y tiene las mismas expresiones clínicas que en otras partes. Mas la existencia de numerosas manufacturas de tabaco, que son sin duda grandes focos de tuberculosis dan cierto caracter especial al problema en Cuba. Otro caracter del problema en nuestro pais, es que hasta ahora a lo menos, las Sociedades particulares, la Liga entre otras, y la acción privada, carecen de los recursos necesarios para hacer, en el sentido de la Profilaxia, una acción realmente eficaz y por eso, mas que en ninguna parte, deben ser robustecidos estos trabajos particulares, por la acción del Estado. En Cuba el problema de la tuberculosis debe ser principalmente función del Gobierno.

Por otra parte, y es este otro hecho especial,—la condición geográfica de la Isla, permite los trabajos de estadística con mas exactitud y amplitud, y este dato es fundamental en el problema de la tuberculosis.

Fija el autor la importancia de ésta y propone entre otras reformas, una completa y robusta organización de la Estadística de tuberculosis en Cuba. Se refiere á las Hospitales, Sanatorios y Dispensarios y aboga por el establecimiento inmediato de Dispensarios en Provincias, por lo menos uno en cada ciudad importante de la Isla.

Hace antes extensas consideraciones sobre todos estos particulares, y termina recordando que el problema de la tuberculosis afecta todos los intereses, y que la Liga Contra la Tuberculosis ha trazado en sus lineas generales la organización de los servicios públicos de tuberculosis.

Le Problème de la Tuberculose en Cuba.—(JACOBSEN.)

Le problème de la tuberculose en Cuba est le même que dans tout autre pays; la maladie relève des mêmes causes et présente les mêmes caractères cliniques. Pourtant le fait qu'il y a en Cuba un grand nombre de fabriques de tabac lui prête un caractère un peu spécial, puisque ces fabriques sont sans doute les sources principales de la maladie. Un autre caractère spécial c'est que, jusqu'à present au moins, les sociétés particulières—et parmi elles la Ligue—comme les agences particulières, ont manqué du

capital nécessaire pour entreprendre des mesures préventives, et pour qu'elles deviennent vraiment efficaces il faudrait qu'elles fussent entretenues et contrôlées par le gouvernement. D'un autre côté les conditions géographiques de l'île permettent facilement de rassembler des statistiques exactes et étendues, qui forment la base du problème de la tuberculose. L'auteur insiste sur l'importance de cette œuvre, et parmi d'autres avis propose une organisation puissante pour l'assemblage de statistiques en Cuba. En parlant des hôpitaux, sanatoriums et dispensaires, il demande instamment l'établissement immédiat de dispensaires dans les Provinces —au moins dans chaque grande ville de l'île. Il s'étend aussi sur d'autres questions. Il conclue que le problème de la tuberculose touche à tous les intérêts et que la Ligue pour l'Empêchement de la Tuberculose a tracé les grandes lignes de l'organisation des services publiques contre la tuberculose.

Das Problem der Tuberkulose in Cuba.—(JACOBSEN.)

Das Problem der Tuberkulose ist im allgemeinen in Cuba dasselbe, wie in irgend einem anderen Lande, und die Krankheit daselbst ist von denselben Ursachen abhängig und zeigt dasselbe klinische Bild. Jedoch die Anwesenheit einer grossen Anzahl von Tabaksarbeitern gibt dem Problem in Cuba einen gewissen speziellen Charakter, da diese zweifellos die grössere Quelle der Tuberkulose sind. Ein anderes spezielles Wahrzeichen von Cuba ist, dass bisher zum mindesten den privaten Gesellschaften—der Liga unter ihnen—und privaten Agenturen die nötigen Hilfsmittel gemangelt haben um prophylaktische Massregeln durchzuführen, und, um wirklich wirkungsvoll zu sein, sollten sie von der Regierung unterstützt oder unter ihrer Controlle sein. Andererseits gestatten die geographischen Verhältnisse der Insel leicht eine ausgedehnte statistische Tätigkeit, welche ein Fundament in dem Problem der Tuberkulose ist. Der Autor malt diese Notwendigkeit aus und schlägt unter anderem eine kräftige Organisation zur Sammlung von Statistiken auf Cuba vor. Er nimmt Bezug auf die Hospitäler, Sanatorien und Ambulatorien und plaidirt für eine eilige Organisation von Ambulatorien in den Provinzen—zum mindesten eines in jeder grossen Stadt der Insel. Er zieht auch andere Fragen in ausgedehnter Weise in Erwägung. Die Schlussfolgerungen sind, dass das Problem der Tuberkulose alle Interessen berührt und dass die Liga für die Verhinderung der Tuberkulose in grossen Zügen die Organisation des öffentlichen Dienstes gegen die Tuberkulose angedeutet hat.

THE TUBERCULOSIS PROBLEM IN THE PHILIPPINES AND THE ELIMINATION OF INTESTINAL PARASITES AS THE FIRST STEP IN ITS SOLUTION.

By Victor G. Heiser,

Passed Assistant Surgeon, Public Health and Marine Hospital Service; Director of Health and Chief Quarantine Officer for the Philippine Islands; Professor of Hygiene, Philippine Medical School.

In recommending to any government a measure which has for its object the improvement of the public health, not only the medical men directly concerned, but the whole medical profession as well, shares in the responsibility involved.

Success following the adoption of a recommendation redounds to the credit of the whole profession; a failure is often used as evidence of the unreliability of medical advice. It is therefore believed that those medical men who are charged with the duty of recommending legislation to legislative bodies should, whenever possible, consult with their medical brethren in order that crystallized ideas submitted may have the support of their majority.

Before a government, be it national, State, or municipal, is asked to give any very substantial support to a health measure, it is desirable to show with reasonable certainty that the public health will be improved, that the estimated cost will be given, that the economic value is apparent, and that it is backed up by experimental or other evidence.

With the foregoing conditions in mind the following is respectfully submitted.

It has only been within the past few years that serious attention has been given to the rôle which intestinal parasites, and more particularly the uncinaria or hookworm, play in the morbidity and mortality statistics of tropical and semitropical countries. Most striking evidence of their importance has recently become available in Manila.

In the large insular prison called Bilibid, over three thousand prisoners are constantly confined. From 1902 to 1905 there was an uninterrupted increase in the death-rate until a mortality of over 200 per thousand per annum was reached. Tuberculosis claimed over 50 per cent. of the victims during 1904. Since December 1, 1904, all prisoners afflicted with pulmon-

ary tuberculosis have been isolated in a separate hospital located in another portion of the city. During the year 1905 the number of deaths from tuberculosis still increased, although the number of new infections was growing less. The general mortality of the prison was also still ascending. The sanitation of the prison was then transferred from the control of laymen to the Bureau of Health. The regularly recognized sanitary measures were at once put into effect, overcrowding was relieved, sewage disposal improved, the sick placed under treatment more promptly, and other well-known measures adopted. The death-rate soon fell to about 75 per thousand per annum, but further reduction seemed impossible. A study of the prison's sick showed that they were dying with ailments to which they should not have succumbed. Their powers of resistance were evidently impaired. The evidence pointed to some extraordinary drain on the system. There was plenty of food, but evidently imperfect nourishment. With a view to discovering the cause, a routine practice of microscopically examining the feces of every prisoner was inaugurated. Eighty-four per cent. were found infected with intestinal parasites. Of these, 60 per cent., or 52 per cent. of the total number of prisoners, had hookworms, 59 per cent. had whipworms, 23 per cent. amœbæ, and 21 per cent. harbored some other species of parasite.

Over half of the prisoners were hosts for at least two kinds of worms. Active therapeutic measures were inaugurated to rid the prisoners of the causes of these debilitating troubles, and the result was immediately satisfactory—the death-rate fell to less than 20 per thousand. The following table, giving the deaths from tuberculosis at Bilibid by months and years, considered in connection with the foregoing, shows that even after isolation of tubercular patients has been carried out, still further reduction in the incidence of tuberculosis may be brought about by increasing the resistance of the individual; that is, by removing the intestinal parasites. For instance, in 1905, the year after the system of isolation was put into effect, there were still 179 deaths from tuberculosis. Much improvement, however, could perhaps not be expected until the following year, and an examination of the figures shows that the tuberculosis mortality did drop to 51. In view of the fact that the elimination of the intestinal parasites was actively begun during the second half of this year (1906), a part of the credit for this satisfactory result must be attributed to their removal, and that this assumption is correct is shown by the fact that in the year 1907, when the elimination of the intestinal parasite was the only remedy used, the deaths fell to 35, and for the present year, based upon the rate of the earlier months, the number should be 28. It is therefore apparent that in a prison which has an average population of about 3000, and in which there were as many as 179 deaths per annum from tuberculosis, the number of cases was reduced to 28 per annum, and that this was brought about by isolating the tubercular sick, by providing

more light and air, and by removing the intestinal parasites—the latter measure having largely contributed to the result. It is perhaps also worthy of mention in passing that the statistics show that the greatest number of deaths during each year occurred between the months of June and October, which correspond to the rainy season.

DEATHS FROM TUBERCULOSIS, BILIBID PRISON.

	1904.	1905.	1906.	1907.	1908.	Total.
January	25	8	3	2	0	38
February	32	0	2	4	0	38
March	5	17	7	7	8	44
April	6	4	1	4	2	17
May	10	11	6	0	2	29
June	10	17	3	4	2	36
July	5	13	3	4	..	25
August	13	29	3	3	..	48
September	17	45	8	1	..	71
October	16	21	7	2	..	46
November	9	7	3	1	..	20
December	13	7	5	3	..	28
Total	161	179	51	35	14	440

Some thousands of stool examinations made in the Philippines outside of Bilibid show that about the same percentage of infections may be expected among the general population.

If, then, we have a prophylactic measure which will effect a marked reduction in the tuberculosis mortality, and at the same time diminish the incidence of a considerable number of other diseases (see sick report published in Annual Reports of the Bureau of Health during past four years), it would appear only rational that this should receive first consideration. There is no desire whatsoever to ignore those measures which have already done so much to curtail the ravages of tuberculosis in other parts of the world; when funds are available, these should all be tried. If not, then it would undoubtedly be best to choose that which will give the greatest results. In a city like Manila a reduction in the mortality of 5 per thousand would mean a saving of 1125 lives annually; at least 150 of these would be from tuberculosis. These figures are for one city. If other tropical countries with similar conditions adopted the same measures for their millions of population, the result is self-evident.

It is believed that the foregoing facts make concrete proof of what may be accomplished in a tropical country, and are sufficient evidence to lay before a legislative body in order that the necessary authority and fund may be provided to put into effect the measures which are indicated.

It may be of interest to present the following table, which shows that tuberculosis steadily increased in the city of Manila until June 30, 1907, and that since that date there has been a decline.

TUBERCULOSIS IN THE CITY OF MANILA BY YEARS.

Year Ending:	Total Deaths from all Causes.	Deaths from Tuberculosis.								
		Larynx.	Lungs.	Meninges.	Abdomen.	Spine.	Other Organs.	General.	Total.	Percentage
8 : 31 : '03	8,892	45	789	20	35	1	7	5	902	10.1
8 : 31 : '04	10,781	59	958	32	35	2	3	13	1,102	10.2
8 : 31 : '05	8,926	59	971	31	45	2	7	17	1,132	12.7
6 : 30 : '06	9,486	23	1,209	41	43	1	8	29	1,354	14.3
6 : 30 : '07	8,251	18	1,146	44	45	..	9	23	1,287	15.6
6 : 30 : '08	8,945	12	1,036	37	37	3	6	36	1,167	13.0
Total....	55,281	216	6,111	205	240	9	40	123	6,944	12.6

The increase in the disease prior to 1907 was in all probability due indirectly to the increase in rents, which resulted in the poorer classes crowding together more and more; in consequence, the light and ventilation per capita in each habitation constantly decreased.

About two years ago an active educational campaign for the prophylaxis and treatment of tuberculosis was begun. A pamphlet was prepared, the contents of which are taught in every public school throughout the Philippine Islands. Popular articles are frequently published in the daily press. Rigid inspection is made of all meat and other food products likely to contain tubercle bacilli; antispitting ordinances were passed and are being gradually more and more rigidly enforced; overcrowding, especially in tenement-houses, has been prohibited; and light and ventilation have been provided for hundreds of houses. Whether these measures are responsible for the reduction in the number of deaths is, of course, not positively known, but it is not unreasonable to infer that much of the credit is due to the improved sanitation. The foregoing shows that at least a start has been made in combating this disease in the Philippines.

If the conclusion of this Congress should justify it, it is proposed, in the coming year, in addition to the measures specifically directed against intestinal parasites, to open a free dispensary in the city of Manila for tubercular cases, and to spend about $20,000 for the treatment of the tubercular sick by the open-air method.

Summary.

1. Before legislation on public health measures is requested, certain conditions should exist. Among these is reasonable certainty that the public health will be improved; that the cost of putting it into effect be estimated; that the economic value be made apparent; and that it is backed up by experimental or other reliable evidence.

2. The annual mortality among 3000 prisoners was reduced from 75 to 20 by the elimination of intestinal parasites; 50 per cent. of this number formerly died of tuberculosis. This was accomplished after the measures heretofore recommended by good authorities had been faithfully but unsuccessfully proposed.

3. Increasing the resistance of an individual to tuberculosis by the elimination of intestinal parasites has proved very effective in reducing the incidence of the disease.

4. As a result of a campaign of education, and by providing more hygienic houses, the number of cases among the general population of Manila was apparently reduced from 15.6 to 13 per cent. of the total mortality.

Conclusion.

It is believed that the foregoing facts warrant the assertion that in tropical countries, where tuberculosis and hookworm disease are coexistent, the elimination of the hookworm will produce better results in diminishing the mortality from tuberculosis than any measure that has as yet been tried upon a large scale; at the same time the general mortality can be markedly reduced.

TUBERKULOSE-GESETZGEBUNG IN DER SCHWEIZ.

Von Dr. Med. Max Bollag,
in Liestal.

Ein einheitliches, das ganze Land umfassendes Tuberkulosegesetz giebt es in der Schweiz noch nicht, doch haben mehrere Landesteile (Kantone) Tuberkulosegesetze und Tuberkuloseverordnungen erlassen, so dass jetzt schon (1908) mehr als ein Drittel der Bevölkerung unter dem Einfluss einer durch Behörden geregelten Tuberkulosebekämpfung steht.

Der bedeutende, volksreiche Kanton Bern hat durch Volksabstimmung ein Tuberkulosegesetz angenommen, das dem Staate die Verpflichtung auferlegt, sich an der Errichtung und am Unterhalt von öffentlichen Krankenanstalten, welche die Verpflegung tuberkulöser Personen zum besonderen Zweck haben (Sanatorien, Tuberkulosespitäler, Tuberkulosestationen in allgemeinen Spitälern), mit Geldbeiträgen zu beteiligen und ebenso andere, im Dienste der Tuberkulosebekämpfung stehende Institute zu unterstützen (Fürsorgestellen, Erholungsstätten, Ferienkolonieen, ländliche Kolonieen, Arbeitsvermittlungsstellen für Tuberkulöse, u. s. w.). Dasselbe Gesetz sieht auch die Einführung von Unterricht über Tuberkulose in Lehrerseminarien und Schulen vor und erlaubt überhaupt die Aufstellung näherer Vorschriften zur wirksamen Verhütung und Bekämpfung der Tuberkulose (Anzeigepflicht, Desinfektionspflicht, Spuckverbot u. dgl.).

Die Verordnung des Kantons Zürich enthält Bestimmungen über das Aufstellen von Spuckgefässen, unentgeltlicher Sputumuntersuchung, schreibt dem Arzte vor, offene Tuberkulosefälle ohne Ausnahme den Gesundheitsbehörden anzuzeigen, ebenso den Wohnungswechsel von Personen mit offener Tuberkulose, wenn Ansteckungsgefahr droht. Die Desinfektion der Wohnung soll nach dem Ermessen des behandelnden Arztes bei Wohnungswechsel und bei Todesfall angeordnet werden, dieselbe wird unentgeltlich durch die informierte Gesundheitsbehörde besorgt.

Das Tuberkulosegesetz des Kantons Graubünden legt dem behandelnden Arzte die Pflicht auf, jeden Tuberkulosetodesfall dem Bezirksarzte, der die Desinfektion anordnen muss, anzuzeigen. War ein an Tuberkulose Verstorbener nicht in Behandlung, so fällt dem Hausherrn, beziehungsweise dessen Stellvertreter die Anzeigepflicht zu. Dasselbe Gesetz ordnet die Nach-

forschung der Ursache bei gehäuften Auftreten der Tuberkulose an, stellt ein beschränktes Spuckverbot auf (in Kirchen, Schulen, anderen öffentlichen Anstalten, Eisenbahnwagen) und erleichtert durch billige Taxbemessung der Sputumuntersuchung die Feststellung der Tuberkulosefälle.

Die Verordnung des Kantons Thurgau verlangt, dass dem Bezirksarzte angezeigt werde jeder Todesfall von Lungen- oder Kehlkopftuberkulose, ebenso jeder Wohnungswechsel eines an vorgeschrittener Lungen- oder Kehlkopftuberkulose Leidenden, oder von sonstiger hochgradiger Gefährdung der Umgebung eines solchen Kranken durch ungünstige Wohnungsverhältnisse, Wohnen in Schulhäusern, Erziehungsanstalten, Kuranstalten, durch Tätigkeit bei der Herstellung und den Verkauf von Lebens- und Genussmitteln in Fabriken, Werkstätten u. s. w. Bei Lungen und Kehlkopftuberkulose und bei Wohnungswechsel bei Personen mit vorgeschrittener, die Umgebung gefährdender Tuberkulose ist die Desinfektion durchzuführen.

Die Regierungsverordnung des Kantons Appenzell a. Rh. empfiehlt als dringend notwendig die Desinfektion bei Tuberkulose. Die Desinfektion wird auf Staatskosten ausgeführt.

In der Landschaft Davos (zahlreiche Privat- und Volksheilstätten) besteht ein Tuberkulosegesetz, welches die Desinfektionspflicht bei Wiederbenützung von Räumen, die vorher von Tuberkulösen bewohnt waren, sowie die Anzeigepflicht beim Wegzug eines tuberkulösen Kranken vorschreibt, den Lungenkranken das Tragen von Taschenspucknäpfen gebietet, das Aufstellen von Zimmerspucknäpfen anordnet und das Ausspucken Lungenkranker im Freien, auf Strassen, Trottoirs, Fusswegen und auf den Schnee als unstatthaft erklärt.

Eine ähnliche Verordnung von Arosa (Kurort für Tuberkulöse mit Privatsanatorien) macht die Desinfektionspflicht von einem ärztlichen Verlangen abhängig, verpflichtet jeden Vermieter zur Anzeige des Wegzuges eines Tuberkulösen, enthält genaue Angaben über die Behandlung der Wäsche von Tuberkulösen, gebietet das Aufstellen von Spucknäpfen in Korridoren und Aborten und verbietet das Ausspucken auf Wege, Strassen und Schnee.

Leysin, ein Kurort mit mehreren Privatsanatorien für Lungenkranke, hat ebenfalls ein Spuckverbot aufgestellt wie Davos und ordnet die Desinfektion an beim Wegzug Tuberkulöser.

In mehreren Kantonen ist die Bekämpfung der Tuberkulose auf das Arbeitsprogramm der politischen Parteien aufgenommen worden (Basel, Solothurn) und es ist Aussicht vorhanden, dass bald alle Gebiete der Schweiz ihre Tuberkulosegesetze haben.

Die oben genannten, in verschiedenen Landesteilen aufgestellten Gesetze und Erlässe sind nicht nach einer Norm geschaffen, sondern zeigen, dass die Bewegung gegen die Tuberkulose noch neu ist und dass die letzten Konsequenzen, welche Tuberkuloseforschung, -experiment und -statistik zu

ziehen gestatten, den Gesetzgeber erst nach und nach veranlassen, eine überall und immer geltende Norm aufzustellen. Jedenfalls darf dem Gesetzgeber auf Grund unserer schweizerischen Erfahrung empfohlen werden, der fortschreitenden Entwicklung der Tuberkulosebekämpfung seine Aufmerksamkeit zu schenken und die Gesetze so zu gestalten, dass der fortschreitenden Erkenntnis ohne Gesetzesänderung Rechnung getragen werden kann, denn nichts verschafft dem Volke mehr Zweifel über den Wert prophylaktischer Massnahmen als rasch und oft wiederholte Abänderung von Gesetzesbestimmungen und Massnahmen gegen Krankheiten. Um den Behörden wegleitende Normen für die Tuberkulosegesetzgebung geben zu können, hat die schweizerische Zentralkommission zur Bekämpfung der Tuberkulose in ihrer letzten Hauptversammlung (Juli 1908) die Frage der Anzeigepflicht und der Desinfektion bei Tuberkulose eingehend behandelt und die Ausarbeitung diesbezüglicher Anleitungen beschlossen.

THE PRESENT STATUS OF ANTITUBERCULOSIS WORK IN CANADA (1908).

PREPARED FOR THE CANADIAN COMMITTEE OF THE INTERNATIONAL CONGRESS ON TUBERCULOSIS.

By J. H. Elliott, M.B.,
Toronto, Canada.

In the preparation of this report an endeavor has been made to incorporate everything which has a bearing on special antituberculosis work in Canada. It is a short review of the various agencies at work, and to some extent of what has been accomplished. The data have been secured from the officials of the Dominion and Provincial Governments and their reports, from the secretaries of various associations, and from other sources.

Canada has an area of 3,745,574 square miles. Its present population is approximately 6,500,000, and annual deaths from tuberculosis 13,500.* The death-rate from tuberculosis, according to census of 1901, is 199 per 100,000 population.

The activities of the Federal government *re* tuberculosis appear in its relation (1) to the Indians throughout the Dominion, who are their wards, (2) immigration, (3) the import and export of cattle, while, by consent of the provinces, (4) the control of disease in animals is given to the Federal authorities.

Public health matters in general, hospitals, asylums, etc., are delegated to the provinces.

Federal Measures.

1. An annual grant of $5000 is made to the Canadian Association for Prevention of Tuberculosis to assist in its work.

2. *Tuberculosis in Immigrants.*—In 1907 immigrants to the number of

* The census of 1901 gave population 5,371,315. The special 1906 census of Manitoba, Saskatchewan, and Alberta showed an increase in those provinces of 745,329. A recent official report of Ontario estimates an increased population in that province of 200,000. There has also been an increase in British Columbia and Quebec, justifying a present estimate for the Dominion of 6,500,000—an increase of 25 per cent. Deaths from tuberculosis according to census of 1901 were 10,708; an increase of 25 per cent. makes present annual deaths 13,485.

196,143 passed medical inspection at sea-port; 16 were debarred on account of tuberculosis. The Immigration Act provides that any immigrant who becomes a public charge within three years may be deported. In 1906 and 1907, of about 350,000 immigrants, at least 100 developed tuberculosis and became public charges. The immigration officials refuse landing to those evidently tuberculous who have not sufficient funds for their support.

3. *Tuberculosis Among the Indians.*—There are 375 bands of Indians, with a population of 110,345; total deaths, 1906, 2511. The death-rate is two or three times that of the general population, the excessive mortality being due to tuberculosis. The death-rate is much higher in the newer provinces than in the east, where the bands have been longer in contact with civilization. For the past three years there has been an increase in the Indian population.

The chief medical officer of the Department of Indian Affairs has been endeavoring to improve sanitary conditions on the reserve, both in the homes and schools. A beginning has been made in removing tuberculous patients from their homes to tent hospitals on the reserves; four have been installed in the northwest, three on large reserves in Ontario, and two other bands supplied with tents. A trained nurse is placed in charge of each tent hospital, and, where possible, she acts as district sanitary visitor.

A medical inspection of some 35 Indian industrial and boarding-schools showed a sad lack of ventilation, while the records of discharged pupils showed an alarming death-rate. Improved ventilation and instruction or isolation of children with open glandular or pulmonary tuberculosis have been instituted.

Bovine Tuberculosis.—The Veterinary Director-General writes: "In view of the fact that no definite, satisfactory, and intelligent method of dealing with bovine tuberculosis has so far been established, the regulations deal almost entirely with export and import cattle. Cattle imported from the United States for breeding purposes or milk production, if unaccompanied by a satisfactory tuberculin test chart signed by an officer of the United States Bureau of Animal Industry, are placed in quarantine and tested. The same rule is applied to cattle of similar classes imported from Mexico. Cattle of any kind coming from other countries are tested in quarantine. The animals comprising a few herds which are placed entirely under the control and supervision of our officers are also tested by and at the expense of the Department. With these exceptions no testing with tuberculin is now undertaken officially, although it is supplied free to qualified veterinarians when employed by owners of cattle, on condition that the results of all tests made by them are sent in to the Department on forms supplied for that purpose. Any animals reacting to tuberculin are permanently ear-marked by cutting a capital T out of the right ear.

"This Department has now been in possession of a tuberculous herd for nearly three years, which have been kept on a farm procured specially for this purpose in the vicinity of Ottawa. The animals in question are under the personal supervision of the Veterinary Director-General, and are being kept out in the open during the winter as well as the summer months. They have not been housed at any time, with the exception of temporary short periods while being submitted to tuberculin, although they have free access during the winter months to large open sheds, but are fed out in the open. A close watch has been kept on each individual animal, in order that reliable information can be obtained as to the probable effect of the application of the principles of the open-air treatment, as also what effect it may have upon the susceptibility of the individual organism, as well as many other phases of the question."

The Department supplies tuberculin free to any municipality for the purpose of testing the herds supplying milk to such municipality; a report of all tests made to be sent to Ottawa.

Provincial Measures.

British Columbia.—(Reported by Dr. C. J. Fagan, Secretary of the Provincial Board of Health.) The province has enacted: (1) That all cases of tuberculosis shall be reported to the medical health officer; (2) that in case of death the room or house shall be disinfected; (3) that spitting in public is unlawful; (4) that all milk dealers must produce a certificate, signed by the provincial veterinary surgeon, that the herd from which their supply is derived is free of tuberculosis.

Sums totaling $50,000 have been voted by the legislature to the British Columbia Antituberculosis Association to aid in erection of their sanatorium for incipient cases and hospital for advanced cases.

The province gives a per diem grant of fifty cents for all hospital patients.

The Board of Health advocates that all general hospitals make special provision for tuberculosis patients. Vancouver Hospital has provided a special building for advanced cases.

The provincial laboratory examines sputum free of charge.

Alberta.—The public health act of this new province enforces notification of all cases of tuberculosis, notification of change of residence, and disinfection after death or removal.

In future all general hospitals must make provision for care of tuberculous patients. Sputum is examined by provincial laboratory free.

Saskatchewan.—This province enacted legislation enforcing compulsory notification and disinfection.

In the absence of special hospitals the provincial health officer is insisting that all general hospitals receiving government aid must make provision

for care of tuberculous patients. Shacks and tents are supplied by the province where no hospital exists. Destitute cases are supplied with milk and eggs at expense of the province.

Sputum is examined by provincial laboratory free.

The public health branch of the Department of Agriculture distributes a large amount of tuberculosis literature.

Manitoba.—There is little special legislation. All samples of sputum are examined in provincial laboratory free of charge.

Municipalities may pass antispitting by-laws.

A charter has been granted to a board of trustees to establish a sanatorium for the province. It is to be indirectly under provincial control and will receive aid from the legislature, and municipalities are empowered to contribute out of the municipal funds for building and maintenance.

All diseased meat is seized and destroyed, but in the case of dairy cattle the great obstacle to efficient legislation is the question of compensation.

Municipalities may pass by-laws making tuberculin test compulsory in all herds supplying milk to the municipality.

Ontario.—The province of Ontario has enacted special legislation to assist in the erection of sanatoriums, granting (grant not to exceed $4000) one-fifth of the cost of a sanatorium erected by any municipality or recognized association. Under this clause four sanatoriums have received each $4000.

In addition to assisting in the initial cost, the government grants assistance to the extent of $1.50 per week per patient for all public ward patients, in lieu of the ordinary hospital grant, which is about twenty cents per day.

The act respecting sanatoriums also provides that no institution shall be erected within 150 yards of any residence. The permission of the local board of health must always be secured.

Municipalities are empowered to contribute toward building and $1.50 per week per patient for maintenance of municipal or existing sanatoriums. Toronto contributes $3.50 per week.

The Factories and Shops' Acts provide for proper ventilation of factories and workshops; 300 cubic feet air-space must be allowed in all factories for each employee. The Inspector of Factories has power to require the employer to provide sufficient spittoons and keep the same clean. Also to order removal of dust, when this is possible, by mechanical means.

Municipalities are empowered to pass anti-spitting ordinances. Also to regulate the erection or occupation of dwellings on narrow streets, alleys, lanes, or in crowded or unsanitary districts.

In 1906 the Legislature voted $15,000 to the Muskoka Free Hospital for Consumptives.

The Secretary of the Provincial Board of Health has gathered a tuber-

culosis exhibit along the lines of that of the National Association for Study and Prevention of Tuberculosis. This is placed at the disposal of local boards of health and antituberculosis associations, to aid in local work against the disease. For six or more weeks in the autumn this exhibit appears at rural fairs.

The provincial laboratories (Toronto and Kingston) examine sputum free of charge.

Quebec.—(Reported by Dr. Elzear Pelletier, Secretary of the Provincial Board of Health.) In January, 1895, the Legislature set apart 400 acres in Trembling Mountain Park for sanatorium purposes, but nothing has been done to supplement this. In June, 1905, the province granted 137 acres on Lake Edward to the Quebec League for sanatorium purposes.

Legislative enactments: (1) Make open tuberculosis notifiable to municipal authorities. (2) Make disinfection obligatory after death or removal. (3) Forbid spitting in streets, roads, public places, buildings, and conveyances. (4) In regard to habitations: provide for (*a*) a minimum cubic space, (*b*) natural lighting, (*c*) prohibition of the use of cellars for day or night occupation, (*d*) minimum cubic space in night refuges, (*e*) open spaces around dwellings, (*f*) damp courses in certain cases. (5) Respecting factories: provide for lighting, cubic space aëration and ventilation, evacuation of dust, etc. (6) In regard to educational institutions, provide for cubic space, ventilation, natural lighting, prohibition of dry sweeping. (7) In regard to dairies, provide, among other things, for (*a*) the notification of tuberculous cases, (*b*) the isolation of suspected tuberculous cows until a veterinary surgeon has verified to the udder not being involved, the certificate to be renewed every three months at least and to be put aside whenever bacterial examinations would show the existence of the bacillus in the milk. (8) Provide for confiscation of meat from tuberculous animals, about on the lines suggested by the Royal Commission on Tuberculosis.

Tracts and sanitary bulletin are distributed gratis.

Sputum is examined at provincial laboratory free of charge.

At the last session of the legislature the government was empowered to name a royal commission to study tuberculosis in the province.

New Brunswick.—The New Brunswick Medical Society and representative business men have met the government urging the establishment of a provincial sanatorium. The Provincial Board of Health has made similar recommendations. The government has promised to consider this at the next session of the Legislature.

Nova Scotia.—(Reported by Dr. A. P. Reid, Provincial Health Officer.) The Provincial Board of Health is active in its endeavors, and the subject is dealt with annually in the secretary's report.

There is legislation *re* spitting in public places.

All city schools are regularly medically inspected and the country schools are getting into line.

Notification is not yet enforced.

For ten years there has been a provincial laboratory for examination of sputum.

City boards of health are active, those of small municipalities dilatory.

There is a provincial sanatorium of 25 beds; initial cost, $20,000; annual grant, $9,000. The province does not intend to provide beds for all, but has undertaken this work rather for its educational value.

Prince Edward Island.—No board of health regulations *re* tuberculosis (1906).

Municipal and Local Measures.

In a former report on this subject* a tabular statement showed the measures in force in the principal cities and towns of Canada.

1. *Antispitting By-laws.*—British Columbia and Quebec have provincial ordinances; elsewhere it is a municipal measure, and such by-laws have been adopted in most cities and towns. In some towns where by-laws have not been passed notices are posted by the boards of health. The street railway companies, almost without exception, have notices posted.

2. *Notification.*—Notification of cases is requested by provincial enactment in British Columbia and Quebec, where it is hoped that this measure may soon be rigidly enforced. In the other provinces five cities and towns have adopted compulsory, and five voluntary, notification.

3. *Disinfection after Death or Removal.*—In British Columbia, Saskatchewan, and Quebec this is a provincial measure. In the towns where compulsory notification is enforced the measure is carried out by the local board of health. In other towns it is only done at request of a householder.

4. *Building Inspection.*—In Vancouver and Victoria, B.C., and in Winnipeg, Manitoba, the law requires every dwelling-house to be so constructed as to afford light-space and air-space in every room, sufficient for the comfort and health of those living in it. The number of persons who may sleep in each room is also regulated, and effective inspection is provided for. This legislation was intended to prevent the herding together of Asiatics in such a manner as to induce disease, but must be classed as an effective antituberculosis measure. These wise measures have been adopted in Quebec as a provincial enactment.

5. *Milk Inspection.*—As far as can be learned, no special measures have been adopted generally beyond ordinary inspection. The cities of Quebec, Moncton, N. B., Portage, La Prairie, Manitoba, demand compulsory tuberculin test in all herds supplying milk to the city.

6. *Special By-laws.*—The town of Gravenhurst passed in 1899 a special

* British Medical Journal, Sept. 22, 1906, p. 689.

by-law prohibiting spitting in public places and instituting supervision by the board of health of all boarding-houses accepting patients afflicted with tuberculosis.

7. *Inspection of School Children.*—This has been adopted in the cities of Nova Scotia. Is thorough in Montreal, Hamilton, Ottawa, Winnipeg, Regina, Vancouver, Victoria, and Pincher Creek. In Golden Lake district, Alberta, a number of schools are jointly endeavoring to secure the services of a medical inspector. Toronto has adopted a form of inspection.

8. *Local Antituberculosis Organizations.*—A list of these, with a note of the work done, appears elsewhere in this report. In some towns where there is no local association philanthropic societies or individuals have undertaken the work, as, for example, in Stratford and St. Catharines, the King's Daughters provide tents and necessaries for advanced cases; in London private philanthropy provides one or more tents, while in Ottawa the May Court Club has organized a dispensary to assist the local association.

9. *Special Hospitals and Sanatoriums.*—No municipality has built a special hospital or sanatorium for the care of its tuberculous poor. Hamilton and Ottawa assisted their local association in building and assist in maintaining patients at the sanatorium or hospital. Toronto voted $50,000 for a municipal sanatorium, but has not built; instead, has given the amount to the Muskoka Free Hospital for Consumptives and Toronto Free Hospital for Consumptives, on their undertaking to care for all city order patients, the city paying the usual per diem allowance.

In British Columbia various municipalities have voted sums to the sanatorium of the provincial association, and will maintain their patients there; this will be followed in Manitoba when their sanatorium is built.

10. *Admission of Patients to General Hospitals.*—Six towns and cities report no hesitation in accepting tuberculous cases into their hospitals; seven admit, but insist on isolation—some using isolation wards. Four admit only incipient cases.

Vancouver General Hospital has a special building for tuberculous patients. Kingston Hospital has special lean-tos or tents. Tents are also in use in St. Catharines, Ont., Moncton, N. B., New Glasgow, N. S.

The provinces of British Columbia, Saskatchewan, and Alberta, as elsewhere noted, insist on all general hospitals making provision for tuberculous patients.

Dr. James Third (Kingston) writes: "The shacks at the hospital are only for incipient cases, and curiously enough for some years have been occupied by students of the University—tuberculous, of course. So much was the student body impressed with the good results to their fellow-students in adversity, and the general educational value of the shack, that they asked to be allowed to erect one."

11. *Tuberculosis Dispensaries.*—Four cities have dispensaries. In Montreal and Ottawa they exist as special dispensaries; in Toronto and Hamilton in connection with the general hospital. The work of these is detailed below.

Tuberculosis in Children.

In Europe and the United States much attention is just now being drawn to the beneficial effect of the seashore on tuberculous children, and many seaside hospitals for children are being established. For many years the Victoria Hospital for Sick Children in Toronto has, during the summer months, transferred all cases of surgical tuberculosis to the Lakeside Hospital on Toronto Island, with most satisfactory results. This island is a large sandbar in Lake Ontario, one to three miles out from the north shore of the Lake and directly in front of the city of Toronto. "The summer hospital is provided with extensive veranda space, so that the patients may enjoy the maximum amount of sunshine and may sleep in their cots in the open air. The beneficial effects of these surroundings are most obvious; it is not unusual to watch with anxiety a serious case of tuberculous arthritis toward the end of the winter in the city hospital, in the hope of tiding the patient over the necessary time, until he is able to be transferred to the Lakeside Home, where one has every confidence that he will be benefited."*

The Toronto Free Hospital for Consumptives has a special ward for children with pulmonary tuberculosis.

In Montreal the Children's Memorial Hospital deals largely with cases of tuberculosis, and has special pavilions, porches, and tents for open-air treatment.

Antituberculosis Associations.

In the campaign against tuberculosis associations have been formed in many parts of the Dominion; of these, two are national in their scope: (1) The Canadian Association for the Prevention of Tuberculosis, with office at Ottawa, is the central organization for educational and legislative work, and with it the various provincial organizations are in affiliation; and (2) The National Sanitarium Association, with office at Toronto, organized in 1896 to build and maintain special institutions for care of pulmonary invalids. Its two sanatoriums accept patients from all parts of Canada, but the Association has no organization outside the province of Ontario.

There are three provincial associations, and a number of local associations have been and are being organized throughout the Dominion.

The following is as complete a list as it has been found possible to make of the various associations in Canada.

* "Tuberculosis of the Bones and Joints," A. Primrose, in the American Practice of Surgery, vol. iii, p. 586.

The Canadian Association for the Prevention of Consumption and Other Forms of Tuberculosis. Organized 1901. His Excellency Earl Grey, Hon. President; H. H. Miller, M. P., President; J. M. Courtney, Esq., C. M. G., Hon. Treasurer; Rev. Wm. Moore, D. D., Secretary, Organizer, and Lecturer, 102 Bank Street, Ottawa.

National Sanitarium Association of Canada. Organized 1896. Under the patronage of Their Majesties, King Edward VII and Queen Alexandra; His Excellency Earl Grey, Hon. President; Lord Strathcona and Mount Royal, President; W. J. Gage, Esq., Chairman of the Executive Committee; J. S. Robertson, Secretary, 347 King St., W., Toronto, Ont.

British Columbia Antituberculosis Association. Under the patronage of His Majesty King Edward VII. Hon. James Dunsmuir, Hon. President; R. Marpole, Esq., President; Dr. C. J. Fagan, Secretary, Victoria, B. C.

The Manitoba Sanatorium for Consumptives. Dr. R. M. Simpson, Chairman; E. M. Wood, Secretary.

The Provincial Association for the Prevention of Consumption, Charlottetown, Prince Edward Island. His Honor The Lieutenant-Governor, Hon. President; Mr. Justice Fitzgerald, President; Dr. J. G. Toombs, Secretary, Charlottetown, P. E. I.

The Western Association (Prince Co.) of Prince Edward Island (Summerside).

NOVA SCOTIA.—*The Colchester Association for the Prevention of Tuberculosis.* Smith L. Walker, Secretary, Truro, N. S.

QUEBEC.—*The Montreal League for the Prevention of Tuberculosis.* Patrons, His Excellency, Earl Grey; Lord Strathcona and Mount Royal; President, Sir George A. Drummond; Secretary, Dr. E. S. Harding.

The Quebec League for the Prevention of Tuberculosis. President, Ed. Tumer; Secretary, Rev. Canon Scott, St. Matthew's Rectory, Quebec.

The District of St. Francis League for the Prevention of Tuberculosis, Secretary-Treasurer, Dr. E. J. Williams, Sherbrooke, Que.

ONTARIO.—*Toronto Free Hospital for Consumptives.* W. J. Gage, Chairman; H. C. Hammond, Treasurer; J. S. Robertson, Secretary, 347 King St. W., Toronto.

Hamilton Health Association. W. D. Long, President; W. J. Southam, Secretary-Treasurer, Hamilton, Ont.

The Ottawa Association for the Prevention of Tuberculosis. His Excellency Earl Grey, Hon. President; James Manuel, Esq., President; Walter Tucker, Secretary-Treasurer, Ottawa, Ont.

The Lanark County Association for Prevention of Tuberculosis. Dr. J. E. Klotz, Secretary, Lanark, Ont.

London Association for Prevention of Tuberculosis. Thirty-six local branches of the National Sanitarium Association.

MANITOBA.—In this province, practically every incorporated city, town, and village is an association to find contributions for the provincial sanatorium and to help in other ways.

SASKATCHEWAN.—Being a recently organized province, no organization has yet been attempted.

ALBERTA.—Five associations have been formed by the Canadian Association, for the special purpose of circulating literature.

BRITISH COLUMBIA.—Every city and town has been organized, either by the secretary of the provincial board of health or the secretary of the Canadian Association, to secure support for the work of the provincial association.

A short summary of the work of these various associations must be given in order to present properly the active work done in Canada.

The Canadian Association for the Prevention of Consumption and Other Forms of Tuberculosis.—This was organized in March, 1901, at the instance and under the patronage of the Earl of Minto, then Governor-General. The objects of this Association are fully set forth in the constitution then adopted.

It is the central association of the Dominion and, with the exception of the National Sanitarium Association and the Toronto Free Hospital for Consumptives, all the associations throughout the Dominion are affiliated with it. The services of the secretary of the Association have been given through all parts of the Dominion in aiding local associations, lecturing, and disseminating literature. As far as possible the Association is always ready to assist any organization in furthering the antituberculosis campaign. Over 4,000,000 pages of literature have been distributed. At the suggestion of the Association, a chapter on the cause and prevention of consumption will be inserted in the forthcoming text-book on hygiene for use in the schools in most of the provinces. In an effort to arouse the Federal and provincial governments to action, forms of petition with accompanying letters have been sent to all county, city, and incorporated town municipalities throughout the Dominion, urging them to petition the provincial government of the several provinces within which they were situated to take action for the purpose of arresting the ravages of consumption in the several provinces, and also asking the provincial government to petition the Dominion government to take joint action with the provinces in order to formulate some practical form of mutual coöperation to this end.

As noted above, the secretary has delivered lectures (about 250) in the principal centers from Prince Edward Island to British Columbia.

The list of provincial and local associations appears elsewhere. In many smaller places when there does not seem room for active organization committees are at work distributing literature.

His Excellency, Earl Grey, Governor-General of Canada, is Honorary President. The Hon. Vice-Presidents are the Premier, Sir Wilfrid Laurier; Hon. Sydney Fisher, Minister of Agriculture; Lord Strathcona and Mount Royal; and the Lieutenant-Governors of the provinces. The executive council has ten members elected by the Association and ten appointed by His Excellency the Governor-General.

The Association meets annually to discuss the various phases of the tuberculosis problem in Canada and to deal with the report of affiliated organizations.

The National Sanitarium Association of Canada.—This Association, the first to be formed in Canada, was established in 1896, and began its work with the opening of the Muskoka Cottage Sanatorium at Gravenhurst, made possible by the gifts of Mr. W. J. Gage and the late Hart A. Massey, Esq., the town of Gravenhurst giving $10,000 to have the sanatorium located near it. In 1902 the Association opened the Muskoka Free Hospital for Consumptives.

These institutions represent a capital outlay of $140,000, and provide beds for 160 patients. Over 2500 patients have received treatment, the maintenance expenditure amounting to $400,000. Some of these patients have been maintained free of all cost for periods of twelve months.

The Association is endeavoring to do its share in checking the spread of this scourge through Canada. All contributions received are devoted to the maintenance of needy patients in the Muskoka Free Hospital for Consumptives, and to the general work of the Association. To further its work thirty-six branch associations have already been formed in the following towns and cities. One-half are contributing funds to maintain one or more beds in the Muskoka Free Hospital.

Branch Associations of the National Sanitarium Association.—The figures in parentheses indicate such associations as have raised the requisite amount of $300 a year to endow one or more beds:

Acton
Brantford (1)
Brussels
Belleville (1)
Brampton
Brockville
Berlin
Cobourg
Campbellford
Exeter
Guelph (2)
Georgetown
Goderich
Hamilton (12)*
Hanover
Ingersoll (1)
Kincardine
Lindsay (1)
London
Orangeville

* A pavilion with 12 beds has been set aside for Hamilton and Wentworth County for the past four years, maintained during that period by the Hamilton Branch Association.

Oshawa (1)
Ottawa (16)*
Owen Sound
Picton
Port Hope
Peterboro (1)
St. Mary's
Sarnia (1)
St. Thomas (1)
St. Catharines
Tillsonburg
Walkerville (1)
Wingham (1)
Woodstock (1)
Montreal (2)
Stratford (2)

The following municipalities have contributed $300 a year to endow a bed in the Muskoka Free Hospital for Consumptives for a period of twelve months. Allowing four months as the average of attendance, this gives accommodation for three patients from these municipalities each year.

Brant Co., Ont.
Brantford City, Ont.
Chatham, Ont.
Niagara Falls, Ont.
Perth Co., Ont.
Grey Co., Ont.
Simcoe Co., Ont.
Lambton Co., Ont.
St. Thomas, Ont.
Lincoln Co., Ont.
City of St. Catharines, Ont.
Oxford Co., Ont.

One hundred and two other municipalities have contributed amounts from $5 to $100 during the past year. In the year ending October 1, 1907, there were admitted to the Muskoka Free Hospital for Consumptives, on order of the municipality from the city of Toronto, 65 patients; the city of Ottawa, 33 patients.

Under statute enactment, any municipality may make an agreement with the Association whereby the institutions of the Association shall treat its patients, and the municipality may pass by-laws or issue debentures to raise money to assist this Association in its work.

Though the primary object of this Association has been "to establish and maintain institutions for the treatment of pulmonary diseases," educational work has been done directly and indirectly. In 1906 the Exhibition of the National Association for the Study and Prevention of Tuberculosis was brought to Toronto for one week, the expenses being met by this Association. The attendance during the week was 12,969.

The Association is under a Board of Trustees, who have power to add to their numbers from those who contribute $100 or more to the Association. Municipalities contributing may be represented on the board.

The Association keeps its institutions before the public through the press and a special publication, "The Door of Hope," in which contributions are

* Ottawa has contributed $4300, which has been accepted by the Association, to set aside two wards for eight patients each in the Muskoka Free Hospital for Consumptives. Ottawa not only has furnished this amount for the purpose named, but provides also for the maintenance of all patients sent under an agreement with the Association.

acknowledged and appeals made for funds to carry on the work of the Muskoka Free Hospital. The annual reports show very definitely the faith of the trustees in the power of printers' ink to assist in securing subscriptions.

The British Columbia Antituberculosis Society.—This Society has been very active since January, 1904, in a campaign of education through the province. Branch organizations have been formed in almost all centers, through which sufficient funds have been secured to open the Tranquille Sanatorium near Kamloops. A ranch of 600 acres has been purchased at a cost of $58,000. The soil is capable of producing almost any kind of crops in luxuriance, and ten acres are laid out in fruit. In connection with this farm there is a grazing ranch of 8000 acres. Under careful management a great proportion of the table supply for a very large institution can be produced. With suitable alteration the existing farm buildings have been utilized, and thirty beds are now occupied. Contracts have been let for a building to cost $65,000, or $100,000 furnished.

The Society will next build a hospital for advanced cases, and $22,000 has been set aside for this purpose. The provincial government has voted $50,000 to the work of the association and grants fifty cents per day per patient. Municipalities contribute $30 yearly per thousand population. Patients contribute if able.

The Society has received generous support everywhere in the province and gives promise of accomplishing splendid work.

The Manitoba Sanatorium for Consumptives.—A board of trustees has been incorporated by the legislature for the erection and maintenance of a sanatorium for the province. The municipalities have been given power to make contributions out of municipal funds for the support of this institution.

The province has voted $25,000 to the sanatorium, and a large sum has been contributed throughout the province. Plans have been prepared, but the trustees have as yet been unable to agree upon a site for the proposed buildings.

Local Associations.

British Columbia.—The local associations have been formed to assist in raising funds for the work of the provincial association. They are doing splendid work.

Ontario.—*Toronto Free Hospital for Consumptives.*—This association has been formed in Toronto to make provision for patients with far-advanced disease. It provides beds for the far-advanced poor of the city of Toronto, but such has been the success of the undertaking that kind friends have made it possible for this association to enlarge its scope, and it soon hopes to be able to accept the far-advanced cases not only of Toronto, but to pro-

vide a number of beds for patients from elsewhere in Ontario. The hospital of this association is situated in Weston, Ont., overlooking the Humber Valley. It is the first institution in Canada to care for those advanced in consumption. With a capital expenditure of $50,000, beds for over 60 patients have been provided. To September 30, 1907, 421 patients had been cared for.

In connection with this hospital there has been opened this year the King Edward Sanatorium (so named by special permission of His Majesty) for paying patients advanced in consumption. This hospital has 25 beds, and admissions are not restricted to residents of Toronto.

Hamilton Health Association.—This association was formed for the purpose of providing a local sanatorium for the early tuberculous cases of this city of Hamilton and county of Wentworth. A splendid site of 100 acres on the table-land overlooking the city was donated to the Association, and on this property has been erected a group of buildings comprising a well-equipped sanatorium of 35 beds. Initial cost of buildings and land, about $32,000. Some of the buildings and much of the furnishing has been secured through the earnest work of the Ladies' Auxiliary Board.

A visiting nurse visits far-advanced cases in their homes, and necessaries are provided.

The Ottawa Association for the Prevention of Tuberculosis, organized 1905, undertakes personal house-to-house visitation of the sick, individual instruction, and provision of necessaries in way of food and clothing, as well as tents and other appliances for outdoor living.

Literature has been distributed, anti-spitting signs placed on the streets and elsewhere, and an active campaign carried on to secure for the city a home for advanced cases. This has been successful; a site is chosen and work will begin at once.

The Association has made a critical study of the deaths from tuberculosis in the city during the past three years, and is moving along lines of improved sanitation in houses.

The Lanark County Association for Prevention of Tuberculosis.—This Association is endeavoring to secure a sanatorium for the county of Lanark and adjacent counties. It is well organized, and public meetings have been held.

QUEBEC.—*The Montreal League for the Prevention of Tuberculosis.*—This was organized in the year 1903. It is carrying on an excellent campaign of instruction and relief. Much literature has been distributed, not only to patients and their families, but in schools, factories, and other institutions. Lectures have been held on the subject in more than thirty Protestant churches and nearly all the Roman Catholic parishes in the city, as well as in several schools, workingmen's clubs, etc. Through the efforts of the

Legislation Committee of the League a by-law has been passed prohibiting spitting on the sidewalk.

All cases of tuberculosis reported to the League by physicians from hospitals or otherwise are visited more or less frequently, as occasion requires, by a qualified inspector, who distributes leaflets of advice, gives verbal instructions, supplies sanitary cuspidors, endeavors to provide better ventilation, and disinfects habitations after death or removal.

In the autumn of 1904 the League opened a dispensary especially for persons suffering from pulmonary tuberculosis, where physicians attend for some hours daily for consultation, and patients may be examined and receive advice and medicines. This branch of the work has grown steadily, is much appreciated, and promises satisfactory results. When thought advisable, patients are provided with nourishing food—eggs, milk, etc., also warm clothing. For those who require nursing at home, the coöperation of the Victorian Order of Nurses is enlisted. Cases in an advanced stage of the disease who have no friends in the city are sent to an institution. The great need in this branch of the work is a sanatorium in a healthy situation for incipient cases. The work is supported by subscriptions from the public, aided by a municipal grant.

In the three years of its existence the League has dealt with about 1300 cases of tuberculosis, some of whom have received continuous care and assistance for many months.

At the last session of the provincial legislature the League asked that legislation similar to "the Ontario Act respecting Municipal Sanatoriums" be enacted. This would doubtless have received sanction but for the act passed at the same session providing for the appointment of a Royal Commission in Tuberculosis for the Province.

District of St. Francis League for the Prevention of Tuberculosis.—This was organized in 1903 and is carrying on a campaign of education. Local societies or subcommittees are formed in each town or municipality of the district about Sherbrooke. The League arranges for examinations of all sputum submitted and looks after all indigent patients.

Quebec League for Prevention of Tuberculosis.—This League has received a grant of land on Lake Edward. (See under head of "Proposed Sanatoriums.")

Nova Scotia.—*The Colchester County Association for Prevention of Tuberculosis.*—This is an association doing work in a comparatively small community. Its work is principally educative. Much literature has been distributed. A series of lectures are given to the pupil teachers of the provincial normal school. The municipal council contributes to the fund of the Association.

Prince Edward Island.—*The Western Association of Prince Edward*

Island for the Prevention of Tuberculosis.—This Association has been active in giving a series of lectures through the western part of the province, distribution of pamphlets and cards, timely articles in the provincial press, addressing teachers' associations, endeavoring to secure preventive legislation, caring for patients by instruction, supplies, and food when necessary.

The Provincial Association, Charlottetown, P. E. I.—This Association has been looking into the subject of school sanitation, caring for patients through a district nurse, and endeavoring to secure notification of all cases in order to insure that the patient is instructed in sanitary living and to secure proper disinfection after death or removal.

List of Special Hospitals and Sanatoriums in Canada.

Ontario.—*Muskoka Cottage Sanatorium,* Gravenhurst. Eighty-five beds; $12 to $18 weekly. For incipient cases.

Muskoka Free Hospital for Consumptives, Gravenhurst. Fifty to 70 beds. Free, or patient pays in part if able. Dr. W. B. Kendall, Physician-in-charge; Dr. C. D. Parfitt, Resident Consultant to both institutions.

The Mountain Sanatorium, Hamilton. For incipient cases. Thirty-five beds. For Hamilton and Wentworth County. Dr. J. H. Holbrook, Physician-in-charge.

Toronto Free Hospital for Consumptives, Weston. For advanced and far-advanced cases from city of Toronto. Free, or patient pays in part if able.

King Edward Sanatorium for Consumptives, Weston. A hospital for advanced cases. Twenty-five beds; $15 weekly; semi-private wards, $8.00. Dr. W. J. Dobbie, Physician-in-charge to both institutions.

Tents and other appliances for treatment of tuberculosis are in use in Galt, Stratford, Peterboro', Ottawa, St. Catharines, Kingston, London. Some are in connection with the local general hospital (Kingston); others are provided by the municipality (Galt); others by local charitable associations (Ottawa, Stratford, St. Catharines) or by private philanthropy (London).

Quebec.—*L'Hopital des Incurables,* Montreal, has 20 beds for consumptives.

The Grace Dart Home, Montreal, for advanced cases; 20 beds. Recently organized by private subscription.

Brehmer Rest, Ste. Agathe des Monts. Patroness, Her Excellency, Countess Grey; President, Mrs. F. H. Waycott; Secretary, Mrs. Geo. Chillas. For patients not definitely tuberculous. Patients pay $4.00 weekly if able. Dr. A. J. Richer, Physician-in-charge.

Nova Scotia.—*Provincial Sanatorium,* Kentville. Twenty-five beds for residents of the province. Patients pay $5.00 weekly. Dr. W. S. Woodworth.

Wolfville Highlands Sanatorium. Ten beds; private. Dr. G. E. DeWitt, Wolfville.

ALBERTA.—*Calgary Sanatorium,* Calgary. Sixteen beds; private.

BRITISH COLUMBIA.—*Tranquille Sanatorium,* Kamloops, for incipient cases. Thirty beds. Free; patients pay in part, if able. Admissions at present limited to residents of British Columbia, Dr. R. W. Irving, superintendent.

DISPENSARIES.

1. *Dispensary of the Montreal League* for the Prevention of Tuberculosis, 691 Dorchester Street. Opened November, 1904. Open six days weekly. When too ill to attend, patients are visited in their houses. Patients are supplied with all the necessaries in the way of food and clothing. The report for 1907 (covering fifteen months) gives this résumé of work: New cases reported, 300; number receiving food or clothing, 80; eggs distributed, 3600; quarts of milk, 2640; clothing, blankets, etc., 500; patients on visiting list, 132; new patients during year, 368; dispensary consultations, 2420; disbursements, $3,628.93.

2. *Tuberculosis Dispensary and Clinic, Toronto General Hospital.* Opened January, 1906. Visiting nurse visits all homes and reports surroundings and conditions. Patient given sputum flask, etc., with instructions. Food and clothing supplied when needed. Special wards available if necessary to bring patients into hospital. Houses reported to Board of Health for fumigation. When possible, patients sent to sanatorium at Weston or Gravenhurst. Dispensary open one day each week. The visiting nurse is paid for by city health department. Visits by nurse, 1807; houses disinfected, 46; quarts milk, 1558; eggs (dozen), 406; new patients, 140; dispensary consultations, 404.

3. *Tuberculosis Dispensary of Hamilton City Hospital.* Opened 1906. The physician of the Mountain Sanatorium attends weekly to examine patients for admission to sanatorium. Those too advanced are visited in their homes by the visiting nurse.

4. *The May Court Club Tuberculosis Dispensary,* Ottawa, Ont., opened June, 1908. Food and clothing, medicine, and other necessaries are provided for use by the visiting nurse of the Ottawa Association for Prevention of Tuberculosis.

PROTECTED SANATORIUMS AND HOSPITALS.

QUÉBEC.—*Lake Edward Sanatorium* of Quebec League for Prevention of Tuberculosis. The Province of Quebec granted in June, 1905, 137 acres for sanatorium purposes, on Lake Edward, 1200 feet above sea-level. Work has begun, and it is hoped that in another year it will be ready for occupation. Rev. Canon Scott reports $35,000 subscribed.

Camp of Montreal League for Prevention of Tuberculosis. There is an earnest endeavor to secure this, but the committee are unable to secure a site.

ONTARIO.—*Ottawa.* A Relief Home for advanced cases will be built at once by the Ottawa Association for Prevention of Tuberculosis. The site is the gift of Mrs. Pugsley, and the plans are ready.

Hamilton. A prominent citizen has given sufficient funds to build a hospital for advanced cases. This will be erected as soon as possible.

London and Middlesex County. A municipal sanatorium was projected, but the movement is temporarily blocked.

MANITOBA.—For the *Manitoba Sanatorium* over $75,000 has been subscribed and building operations will begin when site is decided upon.

THE FACTORS IN FUTURE WORK.

The summary here presented of antituberculosis measures in Canada would indicate that in the past twelve years much has been accomplished. Yet we must deplore the difficulties which so far have prevented our Federal and most of our provincial governments taking action in the matter. Our municipalities are gradually awakening to the need of preventive measures, and each year sees new measures enforced.

The work of prevention requires the coöperation of all the forces available. We must first deal with those suffering with the disease, for inasmuch as the disease is spread only from those having an open tuberculosis, we must concede (leaving out of discussion here the communicability to man of bovine tuberculosis) that the disease would soon all but disappear could all who have an open tuberculosis be placed under proper discipline, and all sputa and other bacilli-bearing discharges be destroyed. Here the responsibility to a great extent rests upon the physician. He must be careful and proficient in diagnosis, and when open tuberculosis is present, inform the patient, so that proper precaution may be observed. Personal instruction must be given.

Special hospitals for detention are necessary, and should be provided for such people as are wilfully unclean and whose habits are such that they are spreading disease about wherever they may be.

Sanatoriums are a necessity for the care of those who cannot be kept under close supervision at home, or whose surroundings are not conducive to recovery, whether this be from unsanitary conditions, the presence of meddlesome relatives and friends, or the thousand and one petty things which prevent a patient following the necessary outdoor life and observing the prescribed rest or exercise. Separate provision should be made for incipient and far-advanced cases.

In cities and the larger towns where poverty is ever present, special dispensaries can do much for those who must continue at work. The dispen-

sary physician and visiting nurse in these cities can play an important part in the warfare against the disease—watchful for unsanitary conditions, ordering disinfection, examining the families of patients, ever watchful for new infections, instructing patient and family in hygienic living.

Notification of all cases of tuberculosis is necessarily a part of efficient work in the crusade, and where there is a live, earnest board of health, which will coöperate with the physicians, no time should be lost in enforcing compulsory notification.

Local associations can do much in assisting the authorities. They can carry on an educational campaign, disseminate knowledge concerning the methods to be adopted for the prevention of tuberculosis, assist in movements for the erection and maintenance of sanatoriums, special hospitals, dispensaries, etc.

Our citizens in general, and especially our school children, must be instructed in the laws of hygiene and health.

We must not forget that every measure that makes for a higher standard of living is of value in the campaign against tuberculosis. In our houses we should avoid dust-gathering and light-excluding hangings, provide proper ventilation, and guard against catarrhal diseases. Our municipal authorities should see that our cities and towns are rendered as sanitary as possible. Keep our streets clean; do away with the smoke nuisance; inspect our schools, workshops, and factories; institute careful medical inspection of school children and of workmen in factories, especially those whose occupation predisposes to tuberculosis; guard our milk-supply, and, through notification, institute careful supervision over all "open" cases, where this is not already being done.

Our provincial governments are awakening to the necessity of doing something to lessen the yearly mortality, and we trust with the aid of the Federal government, we shall soon see an active interest taken in formulating measures to overcome this preventable disease, which is responsible each year for 13,500 deaths in the Dominion.

LA LUTTE CONTRE LA TUBERCULOSE EN HONGRIE.

PAR M. LE DR. C. CHYZER,
Chef de l'Hygiène et de l'Assistance Publique au Ministère R. H. de l'Intérieur.

La Hongrie réunit, sur un territoire relativement restreint, toutes les particularités qu'on ne rencontre ailleurs que dans des pays très vastes et qui sont alors séparés par de grandes distances. Les sommets de la Haute-Tátra et des Alpes de la Transylvanie sont presque toujours couverts de neiges, une maigre végétation de genévriers s'attache à leurs flancs; des forêts séculaires de hêtres et de chênes ombragent les croupes des montagnes moyennes; le terreau humide de la petite plaine hongroise est sillonné par des milliers de cours d'eau, tandis que dans la grande plaine, il arrive qu'on ne rencontre pas une seule source pendant toute une journée de marche; dans la "Hanság", des lieues et des lieues sont couvertes de marécages remplis de roseaux, tandis que le simoun de Serbie, le brûlant "cossovo", forme de véritables collines en soulevant les sables mouvants du désert de Deliblat.

Dans ces contrées de configuration géographique si différente, les populations sont également très hétérogènes. Or, soit que l'on envisage la Hongrie au point de vue de la configuration géographique, soit à celui de l'ethnographie, on constate que la tuberculose est répandue partout, dans toutes les régions, qu'elle atteint toutes les populations et, chose bizarre, chaque configuration géographique a une partie de sa région plus contaminée que les autres. Trois régions de la Hongrie sont plus spécialement infestées et ravagées d'une manière permanente; la première est la partie montagneuse du Nord, comprenant les comitats (départements) de Liptó, Zólyom et Turócz, et habitée par des Slovaques; la deuxième, les environs du lac "Fertö", surtout dans les centres allemands du comitat de Moson; la troisième enfin, les rives de la Tisza et du Maros dans la grande plaine, parmi la population magyare et serbe.

Sur ces trois territoires, la mortalité annuelle causée par la tuberculose dépasse 40 pour 10,000 habitants.

Si nous examinons l'extension de la tuberculose uniquement au point de vue de la race, nous constatons qu'il y a, dans chaque région, des territoires plus atteints que d'autres qui sont relativement favorisés.

Ainsi la tuberculose est fort répandue parmi les Slovaques de la Hongrie

occidentale, tandis que les cas sont peu nombreux à l'Est, chez les Slovaques du comitat de Sáros. Chez les premiers, la mortalité causée par la tuberculose est de 42 à 45 pour 10,000 habitants, tandis que chez les derniers elle est de 27 à 29. Un phénomène singulier reste encore à signaler: la phtisie est beaucoup plus répandue parmi les Magyars vivant disséminés dans les villages que parmi ceux qui résident dans les villes. Ainsi dans les comitats de Békés, Csongrád, Csanád, la mortalité par la tuberculose est de 42 à 45 pour 10,000 habitants, tandis que dans les grandes villes entièrement magyares de Szeged et de Hódmezövásárhely, dans le comitat de Csongrád, bien que la première compte plus de 100,000 âmes, la mortalité reste constamment au dessous de 30, ordinairement à 27 ou à 28. La proportion est aussi relativement favorable à Györ, Komárom, Székesfehérvár et dans d'autres villes magyares. Les conditions les plus défavorables se rencontrent à Fiume et à Szabadka, où la proportion dépasse 60 pour 10,000: la mortalité due à la tuberculose y atteint donc le double de celle dans les villes magyares sus-indiquées.

Cette circonstance prouve clairement que ce sont uniquement les conditions locales qui, en favorisant la propagation des germes infectieux et la disposition morbide, sont, en même temps, les causes de l'extension de la tuberculose. Ces facteurs sont extrêmement variés: selon les localités, c'est tantôt l'un, tantôt l'autre qui devient la cause déterminante de la propagation.

La lutte organisée contre la tuberculose a commencé en Hongrie en 1898; il avait bien été pris auparavant quelques vagues mesures à ce sujet, mais l'organisation proprement dite ne date que de cette année-là. Le point de départ et le signal de la lutte fut le beau discours prononcé à la Chambre des Magnats en 1896, année du millénaire, par le Dr Frédéric Korányi, dans lequel l'illustre professeur de l'Université de Budapest appelait l'attention sur les ravages de la tuberculose en Hongrie et demandait qu'on engageât une vigoureuse action sociale contre ce fléau.

Ce discours eut pour premier effet d'éveiller l'attention de notre société, mais son effet le plus durable fut l'initiative qu'il provoqua de la part du Ministère de l'Intérieur.

Celui-ci appréciant à sa juste valeur l'idée émise d'entamer la lutte dans toute l'étendue du pays, s'empressa de prendre sa part de l'organisation et invita le Conseil d'hygiène à élaborer un avant-projet sur cette question. Ce travail fut achevé en 1897 et servit de base au plan d'organisation officiel de la lutte contre la tuberculose, rédigé par la section sanitaire du Ministère de l'Intérieur. Le Ministre ne se borna pas à en effectuer la réalisation dans le ressort de son Département, mais il invita tous ses collègues du Gouvernement à faire exécuter les mesures proposées dans tous les offices, bureaux ou institutions de leur ressort. En Hongrie, les municipes ont le droit de rendre

obligatoires dans toute l'étendue de leur territoirre, par voie de statuts, certaines mesures d'ordre administratif. En conséquence, le Ministre de l'Intérieur, par la circulaire n° 49851 de 1897, dans laquelle il faisait connaître les principes directeurs de la lutte contre la tuberculose, invita tous les municipes à établir, en tenant compte des circonstances locales, un règlement relatif à cet objet. La circulaire recommandait d'une façon générale l'application des mesures suivantes:

Dissiper avant tout le préjugé que la phtisie est incurable, puis répandre des notions justes sur la nature de la maladie.

Le Ministre de l'Intérieur appelait spécialement l'attention des municipes sur la nécessité d'améliorer les conditions de salubrité des logements et, en particulier, de ceux des ouvriers agricoles, alors encore très négligés.

Une amélioration sensible s'est produite dans ce domaine au cours de ces dix dernières années: plusieurs municipes ont élaboré non seulement un règlement relatif aux logements des ouvriers agricoles, mais ils l'ont fait exécuter dans la plus grande partie de leur territoire; ainsi à Békés, à Szabolcs des maisons propres et salubres ont remplacé les vieilles masures où vivait entassée toute une population d'ouvriers agricoles. La question des cités ouvrières a fait de grands progrès, et beaucoup de fabriques ont construit des habitations irréprochables.* Les exploitations et les domaines de l'État ont toujours donné le bon exemple à cet égard, et la prévoyance du Gouvernement s'est manifestée surtout par l'article XLVI. de la loi de 1907 qui accorde des subventions, prêts ou garanties, destinés à faciliter la construction de maisons pour les ouvriers agricoles.

La circulaire susmentionnée invitait ensuite les autorités à faire leur possible pour améliorer l'alimentation de la population, pour déraciner les habitudes nuisibles et pour parer aux dangers que causent tant les animaux atteints de phtisie que leurs produits, en particulier le lait contenant des germes de tuberculose.

En même temps la circulaire ministérielle recommandait énergiquement aux autorités de veiller au développement de la propreté en général.

En dehors de ces dispositions d'intérêt hygiénique, les autorités recevaient des instructions leur prescrivant de prendre des mesures pour que dans les bureaux, dans les écoles et dans tous les locaux ouverts au public, il soit placé des écriteaux interdisant de cracher sur le plancher, qu'on y installât des crachoirs contenant de l'eau ou un liquide antiseptique, et que, le nottoyage des parquets se fasse avec des torchons humides.

En vue d'éviter la contamination directe, tous les hôpitaux recurent l'ordre d'isoler les phtisiques et de désinfecter soigneusement leurs expectorations.

*Récemment, le Parlement Hongrois a voté une loi décrétant la construction de 10,000 maisons ouvrières à Budapest.

Le Ministre de l'Intérieur, fit écrire, en même temps que la circulaire, une brochure populaire qui fut traduite dans toutes les langues parlées en Hongrie et distribuée à des centaines de milliers d'exemplaires.* La distribution fut renouvelée pendant plusieurs années de suite, la dernière eut lieu en 1907. Le Gouvernement crut alors le moment venu de faire répandre dans le public un traité plus détaillé: il ouvrit un concours pour la rédaction d'une brochure populaire, dans laquelle il fût tenu compte des nouvelles conquêtes de la science. L'ouvrage trouvé le meilleur par le Conseil d'hygiène public fut imprimé et largement distribué.

Afin d'éclairer la population, on fit placarder de nombreuses affiches instructives, et le Gouvernement invita les autorités à faire donner des conférences par des spécialistes. Le Ministre de l'Intérieur pria aussi ses collègues du cabinet de se joindre à lui, ce qu'ils firent avec empressement, et bientôt de nombreuses mesures furent prises dans le but de préserver de la contagion le public aussi bien que les employés.

L'énumération de toutes ces mesures sort du cadre de cet article, je me bornerai à indiquer qu'elles sont en harmonie avec les principes directeurs énoncés plus haut.

Nous devons aussi mentionner que la révision des statuts faite par les municipes sur l'invitation du ministère, a donné, d'une manière inattendue, beaucoup à faire au Gouvernement, car, dans leur zèle, la plupart des municipalités dépassèrent le but et ne craignirent pas d'édicter des dispositions qui lésaient profondément et même limitaient illégalement la liberté individuelle. Avec le temps, ces difficultés finirent cependant par s'aplanir, et, depuis lors, l'œuvre gouvernementale et municipale de la lutte contre la tuberculose est en progrès lent, mais continu.

Parallèlement à cette œuvre, celle de l'action sociale gagnait aussi du terrain et, ce qui est curieux, elle manifesta, tout au début, la tendance d'anticiper sur la marche naturelle des choses. Alors qu'avant 1898 on n'avait encore presque rien fait dans la lutte contre la tuberculose, pas même les premiers pas en vue de répandre les connaissances élémentaires, voilà que le public réclamait déjà l'établissement de vastes sanatoria, qui sont, pour ainsi dire, le parachèvement de cette action.

Les causes de cet engouement sont faciles à expliquer. D'une part, le bruit fait par l'établissement des sanatoria en Allemagne parvint bien vite jusqu'à nous, et dans son beau zèle, sans rechercher les causes profondes de la diminution de la tuberculose en Allemagne, le public voyait dans les sanatoria un remède infaillible contre le mal; c'est pourquoi on mit chez nous une hâte fébrile à en fonder. Par malheur, le temps qui s'est écoulé depuis, a fortement réduit les espérances exagérées qu'avait fait naître le fonctionne-

* Elle parut, en même temps, en français, dans la *Revue de a Tuberculose* susmentionnée.

ment de ces établissements. Une autre raison pour laquelle on désirait des sanatoria, c'était un sentiment d'humanité mélangé d'espoir qui voulait assurer aux infortunés malades un asile avec la guérison; enfin on pensait que la vue de quelques malades guéris serait bien plus efficace pour encourager la société à lutter contre la tuberculose que les mesures d'hygiène et de prophylaxie prises par les autorités et qui avaient sans doute une grande portée, mais qui ne pouvaient montrer des résultats immédiats. Il était nécessaire de mentionner ces choses, car elles expliquent pourquoi, jusqu'à ces dernières années, à part l'action officielle des autorités, tous les efforts sociaux sur le terrain de la lutte contre la phtisie ont tendu à réclamer la fondation de sanatoria et ne se sont guère manifestés dans une autre direction.

La Société du Sanatorium pour tuberculeux indigents à Budapest, fondée en 1897, fut la première association qui, après cinq années de collectes et avec l'assistance libérale de l'État, ouvrit en 1902 le premier sanatorium hongrois, le sanatorium d'Elisabeth, au milieu de la magnifique forêt de Budakesz, près de Budapest. Cette Société se trouve sous la présidence de M. le comte Louis Batthyány, Conseiller intime de S. M. qui prend une part si active à la lutte contre la tuberculose. Quelques années plus tard se constitua, sous la présidence de M. George de Lukács, ancien Ministre des Cultes et de l'Instruction publique, la deuxième grande association, la Société du Sanatorium prince royal Joseph, qui fit construire à Gyula, en 1907, le sanatorium destiné à l'Alföld (la grande plaine hongroise). Le troisième grand sanatorium est dû au Ministre des Finances qui a fait construire aux frais de l'État, dans la montagne d'Algyógy, en Transylvanie, un sanatorium de 100 lits pour les ouvriers tuberculeux des usines de fer de l'État.

Le tout premier sanatorium pour tuberculeux fut, à vrai dire, un petit établissement ouvert en 1897, à Szent-Endre, avec 15 lits. C'est plutôt un lieu de repos où les ouvriers phtisiques encore au début de leur maladie viennent reprendre des forces, grâce à l'air pur et à une bonne alimentation, après quoi ils retournent fortifiés à leur atelier.

Outre les deux grandes sociétés dont nous venons de parler, il s'est formé, dans les provinces, plusieurs petites associations qui, n'ayant pu se procurer les fonds nécessaires à la construction de sanatoria, se sont mises d'une autre manière au service de la lutte contre la phtisie. Celle qui s'est le plus rapprochée du but qu'elle se proposait, est l'association de Nagy-Szeben qui compte ouvrir bientôt sur le mont Sánta, à l'aide d'une subvention de 12,000 couronnes faite par l'État, une maison de repos et de récréation pour étudiants faibles de la poitrine.

Ces derniers temps, l'engouement pour les sanatoria est singulièrement tombé, l'expérience ayant démontré qu'avec la meilleure volonté ni l'État, ni la société ne sont à même de fournir les sommes énormes qu'exigent la

fondation et surtout l'entretien de pareils établissements. D'autres circonstances ont contribué à refroidir l'enthousiasme; on observe en particulier que les phtisiques qui doivent soutenir leur famille, ne vont pas dans les sanatoria lorsque leur mal n'en est encore qu'à son début, car ils n'ont personne pour subvenir à l'entretien des leurs pendant le long séjour qu'ils doivent y faire; d'autre part, les résultats obtenus dans les sanatoria avec les malades avancés ne sont, comme il fallait du reste s'y attendre, nullement en rapport avec les dépenses considérables qu'ils occasionnent.

Peu à peu on s'est rendu compte de ce qu'en Allemagne ce sont principalement des sociétés ouvrières d'assistance et d'assurance dont la fortune s'accroît annuellement de plus de 100,000,000 de marks qui pourvoient aux frais énormes des sanatoria, auxquels nos institutions similaires, qui sont plutôt en déficit, ne peuvent même pas être comparées. L'attention publique s'est donc tournée vers la lutte contre la tuberculose telle qu'elle a été engagée dans les pays où les circonstances ne permettent pas l'établissement en masse de sanatoria et qui peuvent cependant donner des résultats satisfaisants, et, en particulier, vers les dispensaires d'origine française ou belge.

Telle Était la situation lorsque le Ministère de l'Intérieur fut confié à M. le comte Jules Andrássy. Celui-ci se rendant compte de l'importance capitale aux points de vue social, économique et hygiénique de la lutte contre la tuberculose, il a résolu de prendre énergiquement en main la direction du mouvement.

A cet effet, une conférence avait été convoquée sous sa présidence effective; elle avait pour objet d'établir, dans ses grandes lignes, la direction de l'action projetée, après avoir examiné dans leur ensemble toutes les formes que la lutte a prises jusqu'à nos jours. A cette conférence furent invités les fonctionnaires compétents des ministères, les représentants de la Faculté de Médecine et plusieurs spécialistes en ces matières.

Comme il est fort difficile d'éveiller dans notre pays l'intérêt public pour ces sortes de choses, et plus encore d'amener la société à faire des sacrifices, et que par suite les charges de la propagande retombent en majeure partie sur l'État, la conférence s'est surtout occupée des procédés qui pourraient être employés dans le ressort de l'Administration du pays.

Ayant constaté que, par suite de l'état de fortune de notre société, il n'y avait pas grand'chose à attendre d'elle, M. le comte Jules Andrássy a eu soin d'inscrire au budget du Ministère de l'Intérieur un crédit *ad hoc*, afin d'appuyer financièrement les essais dignes d'être encouragés. Il a pris donc dans ce but 100,000 couronnes dans le budget de 1906, 200,000 dans celui de 1907, 500,000 dans celui de 1908, et il s'est procuré ainsi les moyens, non-seulement pour aider les anciennes institutions, mais encore pour en créer de nouvelles.

Parmi ces dernières, celles qui sont le plus en faveur sont les dispensaires; ils paraissent même, dans les conditions où nous nous trouvons, des établisse-

ments désirables, efficaces et l'État les subventionne d'autant plus volontiers que ce sont avant tout de précieux instruments de prophylaxie et, par conséquent, des auxiliaires pour l'accomplissement de sa tâche.

On est en droit de fonder les plus belles espérances sur le fonctionnement judicieux des dispensaires en ce qui concerne le sauvetage des membres bien portants des familles qui comptent des malades et surtout des enfants.

Afin de servir et d'encourager la cause des dispensaires par un exemple à suivre, M. le comte Andrássy a fondé à Budapest, entièrement aux frais de son budget, le premier établissement de ce genre. Une maison dans le VIII[e] arrondissement, habité par une nombreuse population ouvrière, fut achetée, aménagée dans ce but, et devint le dispensaire central. Cet établissement a coûté 80,000 couronnes, et, pour en assurer le fonctionnement, on a donné une subvention annuelle de 40,000 couronnes à la Société du Sanatorium pour tuberculeux indigents de Budapest, à laquelle l'administration du dispensaire avait été confiée. Celui-ci aurait été le premier en Hongrie, mais pendant la durée des travaux nécessités par la tranformation du bâtiment, les zélés promoteurs de l'Association pour la lutte contre la tuberculose du département de Vas, ouvrirent à Szombathely, en 1907, le premier dispensaire hongrois.

En moins d'une année, la cause de ces établissements a fait d'immenses progrès, et quoique nous ne soyons encore qu'au milieu de l'année 1908, il y en a déjà 6 ouverts: 2 à Budapest, un à Szombathely, à Nagyvárad, à Szeged et à Hódmezövásárhely. Les dispensaires de Szabadka, Székesfehérvár et Magyar-Óvár, dont l'établissement est en cours, commenceront à fonctionner dans le courant de cette année. L'État contribue par une somme plus ou moins considérable à l'entretien de tous ces établissements.

Cependant la vigilance de l'État s'étend aussi sur l'entretien des tuberculeux et les soins médicaux qu'ils nécessitent. Outre la subvention élevée qu'il accorde aux deux grands sanatoria susmentionnés, le Ministre a encouragé l'établissement d'institutions similaires; ainsi il a fourni à la Societé de la Croix Blanche de Szombathely, par un don de 45,000 couronnes, les moyens de construire un pavillon isolé avec 25 lits pour enfants tuberculeux, comme annexe à son nouvel hôpital des enfants, et à l'Association des Dames de Turócz, il a donné 50,000 couronnes pour la construction d'un pavillon affecté aux tuberculeux de l'hôpital public de Turócz-Szent-Márton. L'hôpital de Nagymihály a aussi reçu pour la construction d'un pavillon pour tuberculeux 60,000 couronnes (payables en deux années).

On achèvera sous peu dans les environs de Budapest et aux frais de l'Etat, un sanatorium de convalescence pour les enfants tuberculeux de Budapest qui ont subi une opération dans l'Asile des enfants assistés, afin d'assurer et de hâter leur guérison dans un milieu plus favorable. Cependant il faut faire remarquer que la Ligue pour la protection de l'enfance, qui se

trouve sous la présidence de M. le comte Léopold Edelsheim-Gyulay,* sollicite des sanatoria pour les enfants tuberculeux et scrofuleux dans plusieurs régions du pays.

Il faut aussi mentionner parmi les mesures qui ont été prises en vue de faciliter la constatation de la tuberculose, l'installation, à l'Institut d'hygiène et de bactériologie du Ministère de l'Intérieur, d'une station d'analyse microscopique gratuite où les médecins peuvent envoyer les expectorations suspectes de leurs malades.

En vue de la destruction des germes infectieux, les municipalités ont été invitées à rendre obligatoire la désinfection des appartements après la mort ou le déménagement d'une personne atteinte d'une maladie du larynx ou de la tuberculose.

L'action de plus en plus active du Gouvernement a trouvé un écho dans le public et nous pouvons constater avec satisfaction que dans le court espace de temps qui s'est écoulé depuis que M. le comte Andrássy est entré au Ministère de l'Intérieur, un grand nombre d'associations, dont quelques-unes très importantes, se sont fondées dans toute l'étendue du royaume, telles que les ligues pour la lutte contre la tuberculose du Trans-Danube, de la Hongrie méridionale, et parmi les plus grandes, les associations des départements de Vas, Trencsén, et des villes de Pécs, Nagyvárad, Kolozsvár, Szabadka, etc.

* Voir son intéressant article sur la Protection de l'enfance en Hongrie dans la livraison du 15 mai 1908 de le Revue de Hongrie (No. 3 tome 1, p. 332–344).

DIE GETROFFENEN UND NOCH ERWÜNSCHTEN AMTLICHEN MASSREGELN GEGEN DIE TUBERKULOSE IN DER KÖNIGL. FREISTADT KOLOZSVAR (OSTUNGARN).

VOM STÄDT. OBERPHYSICUS DR. JOHANNES BARTHA,
Kolozsvar.

Befassen wir uns mit den Ursachen dieser verheerenden Krankheit und zwar die im allgemeinen teils schon anerkannt sind und mit denen, die der Annahme am nächsten liegen.

In erster Reihe setzen wir eine gewisse individuelle Veranlagung voraus, welche abstammen kann—

1. Durch erbliche Belastung.

2. Von allgemeiner Körperschwäche, entstehend in Folge anstrengender Arbeitsleistung bei mangelhafter oder minder nahrhafter Verpflegung oder in Folge lange andauernder Krankheit.

3. Zufolge Aufenthaltes in engen, feuchten, schimmeligen Wohnungen (mit einem Worte in Folge von Armut); hiezu gesellt sich noch die irre Auffassung, dass der Genuss von Alkohol die ungenügende Nahrung ersetzt und Kraft bietet zur schweren Arbeit, in Folge dessen übermässiger Alkoholgenuss.

4. In Folge tuberkulöser Infektion, vermittelt durch die Atmungs- und Verdauungsorgane.

Betrachten wir nun die, seitens unserer Stadtbehörde zum Zwecke der Beseitigung dieser Ursachen getroffenen Massregeln, welche geeignet waren, auf die Verminderung der Krankheit Einfluss zu üben.

1. *Zur Verhinderung der erblichen Belastung* konnte die Behörde nichts beitragen, nachdem es nicht in ihrer Macht steht, Eheschliessungen der Belasteten zu verhindern. Diesbezüglich wäre nur im Wege eines Landes- oder Internationalgesetzes und Uebereinkommens etwas zu erreichen.

Es verlautbarte nämlich schon vielseits die Meinungsäusserung, dass solche Eheschliessungen entweder auf gesetzlichem oder auf sozialem Wege unmöglich oder wenigstens erschwerend gemacht werden, und zwar möge die Eheschliessung solcher Belasteter entweder gänzlich verboten werden oder nur mit der Bedingung gestattet werden, dass solche nur mittelst ärztlicher

Zeugnisse bestätigen, dass sie nicht erblich belastet sind, ja sogar, dass sie auch in Hinkunft keiner erblichen Belastung unterworfen sind.

Auf sozialem Wege wäre wohl etwas zu erreichen, dass Einfluss bewirkt wird auf die Belasteten, dass sie sich der Eheschliessung enthalten; welche Garantieen hätten wir jedoch dafür, dass diese Verfügungen durch ausserereheliche Vermehrungen nicht illusorisch würden?

Und welcher Physikus würde sich getrauen, wenn jedwelcher Nachkomme belasteter Eltern, der im 25–30sten Lebensjahre in die Ehe treten wollte, es ärztlich zu bezeugen, dass derselbe—in Folge erblicher Belastung—von der verheerenden Krankheit gänzlich befreit sei, wenn auch während der Untersuchung wirklich keine Spur von Tuberkulose konstatierbar wäre. Begegnen wir ja täglich Fällen von Individuen, die bis zum 25–30sten Lebensjahre vollkommen gesund sind, von Bronchial-Katarrh behaftet werden, um den sich zu kümmern sie es anfangs nicht einmal der Mühe wert halten und binnen 1–2 Jahren an Tuberkulose umkommen.

Und was würde mit einem Physikus geschehen, der ein solches angeblich falsches Zeugnis oberwähnten Inhaltes ausstellt?

Nehmen wir an, der Arzt konstatiert bei der Untersuchung verdächtige Symptome: kann er es mit seinem Berufe im Einklange dadurch dass er dem Betreffenden die Art seiner Krankheit mitteilt, dessen Seelenruhe zu Grunde zu richten? Oder wird er, um dies zu vermeiden, wirklich ein falsches Zeugnis ausstellen?

2. *Zur Milderung der Armut* haben wir zwar ein Gesetz, das die Blutsverwandten und die Gemeinden zur Versorgung ihrer angehörigen Armen verpflichtet; ausserdem geschieht diesbezüglich vieles auf sozialem Wege.

Solche Arme sind jedoch ohne Ausnahme alle arbeitsunfähig und—gesetzt den Fall, sie würden Arbeit finden—nicht im Stande, ihr Brod auch nur im geringsten Masse zu verdienen.

In neuerer Zeit sind besonders für gewerbetreibende Arbeiter Krankenversorgungsvereine unter verschiedenen Titeln entstanden, sozusagen gegen einen geringen Mitgliedsbeitrag, ausser einem geringen Unterstützungsbeitrag in barem Gelde auch ärztliche Hilfe und die nötigen Arzneien.

Dies mag auch mit eine der Ursachen sein davon, dass im letzten Dezennium Besserung wahrzunehmen ist. Ich bin der Meinung, dass in Folge des Arbeiterversicherungs-Gesetzes in Zukunft sich die Besserung fördern wird.

Diese Förderung wäre erfolgreicher, wenn neben der Verabreichung ärztlicher Hilfe und der Arzneien der Unterstützungsbeitrag nicht sistiert würde.

Viele der gewerbetreibenden Hilfsarbeiter, in der Bestrebung, sich selbständig zu machen, verlassen die Werkstätte ihrer Brodgeber und richten sich selbständig ein. In der Hoffnung, genügend Arbeit zu finden, um sich einen eigenen Herd zu gründen, treten sie in die Ehe und bestreben sich,

eine den sanitären Anforderungen entsprechende, wenn auch teurere Wohnung zu mieten.

Solche Hoffnungen gehen selten in Erfüllung; in den meisten Fällen vermindert sich die Arbeit, während die Zahl der Familienmitglieder sich vermehrt; über kurz oder lang tritt Not ein, die Nahrung wird schmäler und minderwertiger, die Familie wird gezwungen, die ziemlich entsprechende Wohnung gegen immer schlechtere umzutauschen.

Inzwischen erkrankt das eine oder andere Mitglied der Familie, oder gar das broderwerbende Familienhaupt; Arzt und Arzneien sind zwar zur Verfügung, aber weder genügende Nahrung oder entsprechende Pflege.

Hierauf folgt das Verkümmern, in Folge dessen der Organismus sich zur Reception jedweder Krankheit, in den meisten Fällen der Tuberkulose vorbereitet und zur Ausscheidung der infizierenden Stoffe gänzlich unfähig ist.

3. Hinsichtlich der Besserung der Wohnungsverhältnisse geschah vieles während der Revision der Baustatuten; die Baumeister und Baubesitzer umgehen jedoch dieselben in den meisten Fällen, indem sie die Behörden vor ein *fait accompli* stellen.

Wie gross der Unterschied der Anzahl der Sterbefälle in Folge Besserung der Wohnungen, beziehungsweise der Bauten ist, zeigt sich eklatant, wenn wir die Sterbefälle von zwei *neben einander liegenden Gassen* unserer Stadt betrachten. Als Beispiel mag die Pata- und die Györgyfalvigasse dienen, deren Gebäude, beziehungsweise Wohnungen im ersten Dezennium vollkommen gleicher Art waren, erstere im II. und III. Dezennium ziemlich ausgebaut wurde, während in letzterer kaum einige annehmbare Wohnungen errichtet wurden.

In der erstgenannten Gasse sank die Zahl der Sterbefälle, welche im I. Dezennium 70.76% ausmachte, im III. Dezennium auf 25.59%, hingegen in letztgenannter Gasse von 60.30% blos auf 48.21%. Noch auffallender ist das Verhältnis der Sterbefälle in den Fellegvari-ut und Fellegvari-oldal genannten zwei Gassen, in deren ersterer die Zahl der Sterbefälle von 62.00% auf 34.53% herabgestiegen ist, in letzterer hingegen nur von 44.69% auf 43.90%.

Gerade so wie in den erwähnten zwei Gassenpaaren verhält sich die Abnahme sowohl der Sterbefälle überhaupt als auch derjenigen der tuberkulösen Fälle in allen Bezirken der Stadt; in den Bezirken hingegen, wo auch gegenwärtig noch viele enge, feuchte Schlupfwohnungen reichlich sind, ist kaum oder eben gar keine Besserung wahrzunehmen.

Sehr traurigen Erfolg ergiebt die mangelhafte Nahrung, deren Grund gewöhnlich in mit der Verminderung des Erwerbes unter den Familienmitgliedern vorkommenden Krankheitsfällen, Faulheit, arbeitsscheu gepaarten Trunksucht liegt, zu Folge welcher im III. Dezennium die tuberkulösen Sterbefälle bei den Kindern im Alter von 0–5 Jahren und bei den Jünglingen im Alter von 15–25 Jahren auffallend zugenommen haben.

Auch der Umstand, dass 12% der Verstorbenen als lebensunfähig und mit verschiedenen Krämpfen zu Grunde gehen, ist der Trunksucht zuzuschreiben.

Auf behördlichem Wege konnte zur Verhinderung des Alkoholismus nur soviel geschehen, dass die Sperrstunden der Schenken verkürzt wurden. Auf sozialem Wege wurde ein Anti-Alkoholisten-Verein gegründet.

4. Die Infektion geschieht im Wege der Athmungs- und der Verdauungsorgane.

(a) Die Athmungs-Organe nehmen die Infektionsstoffe unmittelbar aus dem eingeathmeten Staube ein. Diese Stoffe stammen einerseits aus dem durch tuberkulöse Kranke in den Gassen ausgeworfenen Speichel und andererseits aus den Staubtüchern, die durch die Fenster auf die Gasse geschüttelt werden.

Unsere Behörde hat sich im III. Dezennium bemüht, es durch wiederholte Kundmachungen zu erreichen, dass das Speichelauswerfen auf den Gassen unterbleibe. Unterbringung von Spucknäpfen auf der Gasse hat wegen Ungezogenheit der niederen Klassen des Volkes nicht stattgefunden.

Das Ausschütteln der Staubtücher auf die Gassen ist bei Strafe verboten.

(b) Behufs Verhinderung der Infektion im Wege der Verdauungsorgane wurden im III. Dezennium strenge Marktregeln in's Leben gerufen.

Namentlich dürfen Lebensmittel auf die Marktplätze nur in absolut reinen Gefässen, Körben etc. geliefert werden; gebraten oder gekocht geniessbares Obst, Mehlspeisen, Backwerk etc., müssen immer zugedeckt sein; blos je ein Stück darf als Muster unbedeckt bleiben. Süsse und sonstige Zuckerbäckerwaren dürfen nur in mit gut schliessenden Glasdeckeln versehenen Kästen feilgeboten werden.

Das Auswählen der Backwerke und Betasten derselben ist verboten.

Die Fleischwaren kommen von der gemeinsamen Schlachtbrücke in den Verkehr. Hier überwacht ein Direktor (pensionierter Oberinspektor des Tiersanitätswesens) nebst zwei städtischen Tierärzten die gesunde Qualität des Fleisches.

Schliesslich werden die Wohnungen, das Bettzeug und die getragenen Kleidungsstücke der an Tuberkulose Verstorbenen nach der Beerdigung von Amts wegen desinfiziert.

* * * *

Als Ergänzung der umschriebenen und vollzogenen Massregeln würde ich noch den Vollzug folgender Verfügungen für nötig halten:

(1) Behufs Verringerung der Erblichkeit wäre es notwendig, belasteten Eltern und solchen allgemein schwacher Konstitution dazu Hilfe zu leisten, dass solche Mütter ihre Neugeborenen nicht selbst säugen, sondern dieselben entweder mit gesunden Ammen oder mit Kuhmilch bekannter Güte erziehen. Notwendig wäre auch die Hilfeleistung seitens wohltätiger Vereine oder Kinder-Versorgungs-Anstalten zur weiteren Erziehung der Kinder.

(2) Behufs Milderung der Armut wäre die Errichtung von Fabriken, gemeinsamen grossen Werkstätten und industriellen Anlagen nötig, damit die Arbeiter zu Beschäftigung und somit zu Erwerb gelangen.

Gleichzeitig jedoch wäre die Verfügung notwendig, dass die Zahl der Schenken vermindert werde und dass dieselben nicht bis spät in die Nacht geöffnet bleiben dürfen.

(3) Nötig wäre weiter die Statuirung strenger Bauordnungen, welche das Bauen von Kellerwohnungen, von engeren Wohnungen als 20 Quadratmetern und niederen als 3.5 Metern auf keinen Fall gestatten würden und im Falle der Umgehungen der Bauordnungen wäre nebst Verhaltung dazu, dass der betreffende Bauteil abgerissen werde, sowohl der Baumeister als auch der Baubesitzer strenge zu bestrafen.

Wenigstens 20% des zu bebauenden Grundstückes müsste frei gelassen werden.

Für die Arbeiter ärmeren Standes wäre mit auf gesundem Boden zu errichtenden gesunden und wohlfeilen Wohnungen vorzusorgen.

Der Infektion wäre durch behördliche Anordnungen, deren Befolgung strenge überwacht und deren Umgehung strenge bestraft würde, in der Weise vorzubeugen, dass das Speichelauswerfen auf öffentlichen Gassen verboten würde; hiebei wäre die Schädlichkeit solchen Gebahrens auf sozialem Wege in den weitesten Kreisen zu verkünden.

Auf behördlichem Wege wäre weiter das Ausschütteln des Staubes auf die Gassen bei Strafe zu untersagen.

Auch wäre die Entfernung der Teppiche aus den Wohnungen auf sozialem Wege zu Stande zu bringen.

Notwendig wäre strenge Kontrolle über die zum Verkaufe angebotenen Nahrungsmittel, regelmässige Untersuchung der Kuhställe und der Melkkühe, Verbot des Verkaufes von Milch tuberkuloseverdächtiger Kühe und Hinwirkung auf sozialem Wege, dass Milch nur in aufgekochtem Zustande genossen werde.

Schliesslich wäre Tuberkuloseverdächtigen das Melken der Kühe und der Umgang mit der Milch strengstens zu verbieten.

The Municipal Regulations Adopted against Tuberculosis in Kolozsvar, East Hungary, and the Measures Recommended.—(BARTHA.)

I. (1) The new Hungarian law relating to insurance of workmen is destined in the future to act as a powerful hindrance to the spread of tuberculosis. (2) A good deal was accomplished by the recent revision of building regulations to improve the living conditions. (3) The closing hours of taverns have been shortened. (4) By means of repeated proclamations the attention of the inhabitants has been called to the danger of indiscriminate

expectoration. (5) A penalty is attached to shaking out dust-cloths on the street. (6) Provisions must be brought to market in absolutely clean vessels, baskets, etc. Fruit, pastry, etc., must be protected from flies; confectionery may be exposed for sale only in cases covered with tightly fitting glass lids, and customers are not permitted to finger the wares for the purpose of making a selection. (7) The salting is done in a common abattoir, from which the meat is sent out to the dealers. In the abattoir the quality of meats is controlled by a director, and two veterinary surgeons are appointed in the service of the city. (8) Rooms occupied by persons who died of tuberculosis, their bed-linen and the clothing used by them, are disinfected by the city.

II. The following additional regulations are recommended: (1) That assistance be given to puerperal women among the poorer classes so as to relieve them of the necessity of nursing their children when they do not possess a strong constitution. The furnishing of suitable cows' milk for their infants. (2) The encouragement of industries in order to mitigate the poverty of the lower classes. (3) The reduction in the number of taverns. (4) Stringent building regulations. (5) The erection of cheap dwellings for women. (6) Spitting to be strictly forbidden. (7) The removal of tuberculous patients and those who are suspected of tuberculosis, from dairies. (8) Strict supervision of dairies.

La Regularizacion Municipal adoptada contra la tuberculosis en la Ciudad Libre Kolozsvar, Hungaria del Este, y las medidas Recomendadas.—(BARTHA.)

I. (1) La nueva ley de Hungaria con relación al aseguro de los obreros, esta destinada a ser en el futuro un poderoso factor contra la propagación de la tuberculosis. (2) Mucho se ha conseguido con la revisión reciente en cuanto a la regularización en la construcción de los edificios y el mejoramiento de las condiciones de vida. (3) Las horas en las cuales deben cerrarse las tabernas han sido disminuidas. (4) Por medio de repetidas proclamas la atención de los habitantes se ha despertado en cuanto a los peligros de la expectoración. (5) Existe una penalidad contra el sacudir el polvo de los vestidos en las calles. (6) Las compras en los mercados deberán hacerse en recipientes limpios, canastas, etc. Las frutas, colaciones, etc., deben estar protejidas de las moscas; la venta de dulces y pasteles se permite solamete cuando estos estan guardados en recipientes bien cerrados, y al comprador no le es permitido tocar con los dedos los objetos de venta a fin de hacer la selección de éllos. (7) El destase y salado de las carnes es hecho en los rastros, de donde éstas son enviadas a los vendedores. En los rastros la calidad de la carne esta bajo la supervisión de un director y dos veterinarios nombrados por la ciudad. (8) Las habitaciones en las cuales ha fallecido

una persona de tuberculosis, la ropa de cama y los vestidos usados por el difunto, son esterilizados por la ciudad.

II. Las regulaciones siguientes son tambien recomendadas. (1) Se les da asistencia, durante el estado puerperal, a las mujeres pobres a fin de evitarles la necesidad de nutrir ellas mismas a sus niños cuando estas no poseen una constitución fuerte. Se les proveé de leche para la alimentación de sus niños. (2) El aumento de las industrias á fin de aliviar la clase pobre. (3) La reducción del numero de tabernas. (4) Regularización extricta en la construcción de las casas. (5) La construcción de habitacines baratas para las mujeres. (6) El acto de escupir está extrictamente prohibido. (7) La eliminación de personas tuberculosas y de aquellos sospechosos de la enfermedad en las lecherias. (8) Supervisión extricta de las lecherias.

Arrêtés Municipaux, adoptés déjà contre la Tuberculose dans Kolozsvar (Hongrie orientale), et Autres Mesures recommandées.—(BARTHA.)

I. (1) La nouvelle loi hongroise d'assurance pour les ouvriers est destinée à agir désormais comme un puissant obstacle au progrès de la tuberculose. (2) Un grand pas en avant a été fait pour améliorer les conditions de vie par la révision des règlements portant sur les habitations. (3) L'heure de fermeture des tavernes a été avancée. (4) L'attention des habitants a été portée par le moyen de proclamations sur le danger des crachements. (5) Il est interdit sous peine d'amende de secouer les linges à épousseter dans la rue. (6) Les provisions doivent être amenées au marché dans des paniers ou vases absolument propres. Les fruits, la pâtisserie doivent être protégés contre les mouches; la confiserie ne peut être exposée pour être vendue que dans des rayons couverts soigneusement par des glaces, et les acheteurs ne peuvent toucher les marchandises pour faire leur choix. (7) Le bétail est abbatu dans un abattoir commun d'où la viande est envoyée aux marchands. Dans l'abattoir la qualité de la viande est contrôlée par un directeur et par deux vétérinaires au service de la ville. (8) Les chambres, la literie et les vêtements de personnes mortes de la tuberculose sont désinfectés par la ville.

II. Les règlements suivants sont reccommandés (1) Que des secours soient fournis parmi la classe pauvre aux femmes en couche, pour délivrer celles qui ne possèdent pas une forte constitution de la nécessité d'allaiter leurs enfants, et qu'on leur fournisse du lait de vache. (2) Que les industries soient encouragées pour diminuer la misère. (3) Que le nombre de tavernes soit réduit. (4) Lois sévères portant sur les habitations. (5) Construction de maisons ouvrières à bon marché. (6) Stricte interdiction d'expectoration. (7) Exclusion des personnes atteintes de tuberculose ou supposées atteintes, des laiteries. (8) Surveillance stricte des laiteries.

CONCLUSIONES SOBRE LA PROFILAXIA DE LAS TISIS.

Por Dr. Camilo Calleja,
Valladolid.

1. El indice que mejor revela las malas condiciones en que viven los habitantes de las poblaciones es la mortalidad por tisis; y viceversa, el verdadero progreso ó mejoramiento de la sociedad en las poblaciones se marcara sobre todo por la reducción de astenicos y el consiguiente descenso en el numero de defunciones por tisis.

2. Deben considerarse como enfermedades distintas ó diferentes especies morbosos las tuberculosis primitivas ó exogenas, esto es, sin predisposicion, y las tuberculosis consecutivas á otras enfermedades, ó tuberculosis anfigenas, cuyo principal factor es alguna astenia precursora; y tambien diferenciamos las tisis en exotisis y anfitisis, segun que procedan de una ú otra especie de tuberculosis. Ademas, las anfitisis son procesos muy complejos, no solamente por los antecedentes, sino tambien por contribuir á desarrollar la enfermedad otras bacterias que no son tuberculosos.

3. Cuando los tegumentos (piel y mucosa de los orificios exteriosos) se hallan en estado normal, sin astenia, ni soluciones de continuidad, no se producen las tuberculosis aunque los germenes determinantes se pongan en contacto; mientras que se los bacilos se yuxtaponen sobre tegumentos asténicos encuentran masa abonada para su proliferación hasta invadir todos los tejidos que se hallen en dicha condición.

4. Cuando se inoculan los bacilos tuberculosos á sujetos sanos, producen infecciones que son siempre nocivas; pero cuando se yuxtaponen en partes asténicas, producen invasiones beneficiosas (microbiomaquia), porque dichos germenes estimulan la reacción vital por su acción oxidante y termógena, con lo cual se mejoran los estados asténicos y se dismimuyen las predisposiciones á muchas enfermedades caquectizantes, como las tisis, anemias progresivas, leucemias, neoplasias malignas y gangrenas. Por tanto, las tuberculosis anfigenas son afecciones curativas.

5. Poquisimas personas realmente fuertes se ponen tisicas por el contacto más ó menos intimo con tisicos; mientras que los individuos débiles ó asténicos, sobre todo si son dolicosomas (cuerpo estrecho) y residen en poblaciones no situadas en climas de altura, se ponen frecuentemente tisicos. Por consiquiente, la exposición al contagio del virus tisiogeno depende principalmente de las condiciones individuales y enfermedades asténicas que

padezca ó haya padecido el sujeto ó sus progenitores y raras veces ocurre el contagio sin dichos antecedentes.

6. Las tisis son las causas inmediatas de mayor mortandad; pero las tisis más frecuentes y que producen mayor numero de defunciones no son las primitivas ó puramente tuberculosas (exotisis) sinó las tisis mixinfecciosas consecutivas á las astenias y sobre todo la determinada por escasez del oxigeno constitutivo de nuestro cuerpo (hipoxigenia). Por tanto, debemos culpar primeramente á la hipoxigenia y despues á las otras astenias de la muerte de la mayoria de los casos que figuran en la estadistica bajo el encabezamiento de tuberculosis. Las tisis agudas y demas exotisis son todas, ó casi todas, mortales; pero, la mortandad por ellas es poco numerosa porque son infrecuentes.

7. Hay que proclamar el dualisimo profilactico de las tisis, puesto que para prevenir las anfitisis hemos de evitar y tratar las enfermedades asténicas, sobre todo la hipoxigenia, mientras que para prevenir las exotisis hay que procurarse la limpieza higienica (asepsia y antisepsia) á fin de librarse todo lo posible de las exposiciones al contagio del virus tuberculoso. Contamos, sin embargo, con una medida profilactica comun á todas las tisis y es la purificación del ambiente, puesto que asi se evitan las hipoxigenias primitivas y á la vez se aminora la profusion bacilar y con esto habrá menos exposición al contagio.

8. Aunque las tuberculosis ordinarias ó anfigenas sean afecciones curativas (teraponosis), sera mejor, sin embargo, prevenirlas, librando á la humanidad de las astenias, que tener que curar estas cuando los sujetos son ya el pasto de los bacilos tuberculosos. Por consiguiente, la profilaxis de las anfitisis ha de comprender la prevención y curación de las astenias que más predisponen á las tisis, á saber: hipoxigenia, discrasias asténicas (especialmente los dolicosomas), infecciones crónicas (sifilis), intoxicaciones cronicas (alcoholismo), y anémias anhigidas (subalimentación, ponosis é inaccion).

9. Hay muchas probabilidades de poder prevenir las anfitisis cuando el estado asténico no es demasiado intenso, aunque se halle ya la predisposicion en el grado fimatoso ó tuberculoso propiamente dicho. Pero no han de confundirse los terminos "tisis" y "tuberculosis" como suele suceder. Dominemos el terrorifico prejuicio que produce la cifra de mortandad consignada por la estadistica en la casilla de tuberculosis, pues al apuntar bajo este nombre todas las defunciones por tisis se padece un error, porque la mayoria de las tisis no son puros contagios tuberculosos sino consecuencias de mixinfeciones que vienen á complicar enfermedades astenicas. Trás dicho error suele venir el falso juicio de creer que el médico se equivoca cuando se cura un enfermo diagnosticado de tuberculosis, siendo asi que las afeciones tuberculosas son las más curables.

10. Para librarse de las astenias precursoras de las anfitisis hay que satis-

facer las principales preceptos de la higiene, especialmente abasteciendo á la naturaleza humana de los medios esenciales (ambiente y alimentos), ejerciendo con proporcionada actividad las funciones del cuerpo, y siguiendo las medidas sociales y privadas que sirven para librarse se las infeciones é intoxicaciones más frecuentes. Tambien hay remedios quimicos y fisicos que pueden ejercer una acción paliativa sobre las astenias, advirtiendo que no hay recurso alguno que sea especifico, puesto que las tuberculinas y productos sucedánios únicamente benefician por su accion eubiósica o estimulante de la reacción vital, perjudiciando á los asténicos si llegasen a producer en ellos la inmunizacion, puesto que, entonces, impidiendo la invasion de los bacilos tuberculosos se desarma a la naturaleza de la influencia de este gran remedio.

11. La profilaxis de las exotisis ofrece, al parecer, dos indicaciones: ataque contra los bacilos tuberculosos, y defensa del cuerpo por medio de la inmunizacion. Pero aunque estas dos indicaciones sean racionales, en la práctica no pueden satisfacerse puesto que el virus se halla en todas partes, es ubicuitario y siendo las exotisis padecimientos tan raros seria imprudente inocular los productos inmunizadores a los individuos fuertes. Quando es de todo punto imposible saber si el presunto remedio seria peor que el mal que se queria evitar. Por tanto la profilaxis de las exotisis se reducira a seguir las reglas generales de la limpieza minuciosa (asepsia y antisepsia) de las partes que se hallan mas expuestas a la inoculacion del virus tuberculoso, como sucede donde hay alguna herida en individuos que permanecen en lugares insanos, ó que viven en contacto intimo con tuberculosos que arrojan productos morbosos al exterior.

Corolarios.

Proposiciones á los altos poderes sobre las medidas mas perentorias que estos han de tomar para reducir la enorme cifra de mortandad por tisis.

1. Fomentar la educacion profilactica en escuelas y gimnasias al aire libre, donde no se pervierta el instinto de conservacion de los niños que repelen los lugares cerrados, y donde se procure desarrollar y ejercer proporcionalmente las fuerzas musculares y las facultades intelectuales, con lo cual se forman buenas naturalezas, y por tanto se aminorará la tendencia a los vicios y se disminuera considerablemente el numero del tisicos.

2. Propagar la instruccion profilactica por medio de cartillas populares, para enseñar, principalmente a las madres, las reglas, la buena alimentacion, de la limpieza y de los cuidados en el ejercicio de las actividades voluntarias tanto corporales como intelectuales, y tambien promulgar, colocando en los sitios donde mas se cometen las faltas de higiena, carteles en los que se adviertan los peligros de los contagios venereos y las consecuencias del alcoholismo y nicotismo, no solo para si pero tambien para la prole.

3. Perfeccionar la inspecion sanitaria para que se cumplan las reglas profilacticas, teniendo un buen personal al que, a cambio de una retribucion que le permita vivir con independencia, se le exiga el cumplimiento de sus deberes, entre los cuales los principales han de ser: procurar que tengan buen ambiente y alimentos sanos los habitantes de las poblaciones; perseguir los vicios y no permitir que se interrumpar el descanso ni el trabajo de los cuidadanos en las horas oportunas, y en fin que haya limpieza tanto dentro de las casas como en la via publica.

Prophylaxie de la phtisie.—(CALLEJA.)

A. Classification de la phtisie en amphiphtisie et exophtisie divisant la premiére en hypoxigénétique, diathétique, syphilitique, alcoolique, etc.

B. Prophylaxie de l'amphi phtisie en général et de ses diverses variétés en particulier.

C. Prophylaxie de l'exophtisie ne considérant recommandable aucune immunité préventive.

D. Conclusions: des déductions résumant les idées les plus importantes à propos de la prophylaxie de la phtisie.

Prophylaxe der Schwindsucht.—(CALLEJA.)

A. Klassifizierung der Phthisis in Amphi-Phthisis und Exo-Phthisis; die erstere wird eingeteilt in: hypoxigenetische, diathetische, syphilitische, alcoholische, etc.

B. Prophylaxe der Amphi-Phthisis im allgemeinen und ihrer verschiedenen Arten im besonderen.

C. Prophylaxe der Exo-Phthisis in Bezug auf präventive Immunisation nicht zu empfehlen.

D. Schlussfolgerung: Schlüsse, die bedeutendsten Ideen über die Verhütung der Schwindsucht zusammen zu stellen.

Prophylaxis of Phthisis.—(CALLEJA.)

A. Classification of phthisis into amphi-phthisis and exophthisis, dividing the former into: hypoxigenetic, diathetic, syphilitic, alcoholic, etc.

B. Prophylaxis of the amphi-phthisis in general and of its several varieties in particular.

C. Prophylaxis of the exophthisis considering preventive immunization not recommendable.

D. Conclusions: Deductions summarizing the most important ideas about the prophylaxis of phthisis.

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

THIRD SESSION.

Tuesday afternoon, September 29, 1908.

TUBERCULOSIS IN LIVERPOOL. THE WORK OF THE INTERNATIONAL ASSOCIATION AGAINST TUBERCULOSIS. THE RELATIONS OF THE FEDERAL GOVERNMENT TO THE TUBERCULOSIS PROBLEM. JOINT SESSION BETWEEN SECTIONS V AND VI TO DISCUSS THE RELATIONS OF POLICE POWER TO PUBLIC HEALTH.

Section VI was called to order by the President, Surgeon-General Walter Wyman, on Tuesday afternoon, September 29th, at half-past two o'clock.

Mr. A. Shelmerdine, Counsellor of the City of Liverpool, presented the first paper, that of Dr. E. W. Hope. Mr. Shelmerdine expressed Dr. Hope's regrets that he could not attend the Congress.

THE DECLINE OF PHTHISIS AND OF OTHER FORMS OF TUBERCULOSIS IN LIVERPOOL.

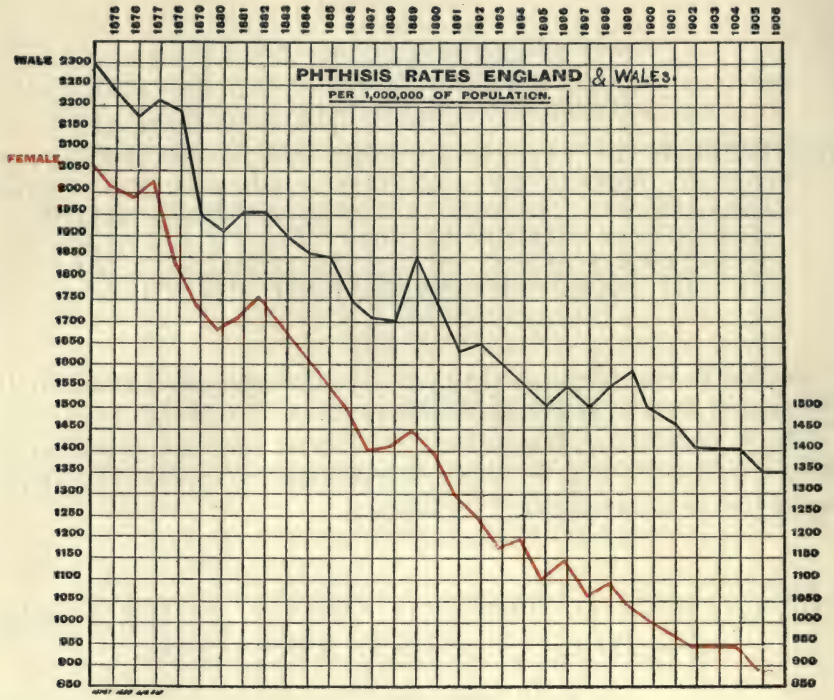
By E. W. Hope, Esq., M.D., D.Sc.,
Medical Officer of Health, Municipal Offices, Liverpool.

The city of Liverpool affords a singularly interesting illustration of the connection between improved sanitation and the promotion of the public health. The decline in Liverpool of phthisis, and of other forms of tuberculosis, as the outcome of direct improvements in sanitation, is so conspicuous as to deserve attention from an international congress, such as that of Washington, and I wish, in the briefest possible manner, consistently with making the subject plain, to lay the facts before the meeting.

The charts exhibited on the wall indicate the decline in the deaths from

phthisis during the last twenty-three years. These serve to establish the fact of a material decline, during that period, in the prevalence of phthisis, more especially among females, the less marked decline in the male rate being at least partly due to employment, exposure, and habits of life. The rate in the city of Liverpool in this particular follows that of England as a whole.

If instead of taking the period indicated we take a much longer one,—going back to the year 1856, as shown on the chart,—we find the death-rate



No. 1.—Deaths from phthisis per 10,000 of the population in England and Wales since 1838. Sexes differentiated since 1875.

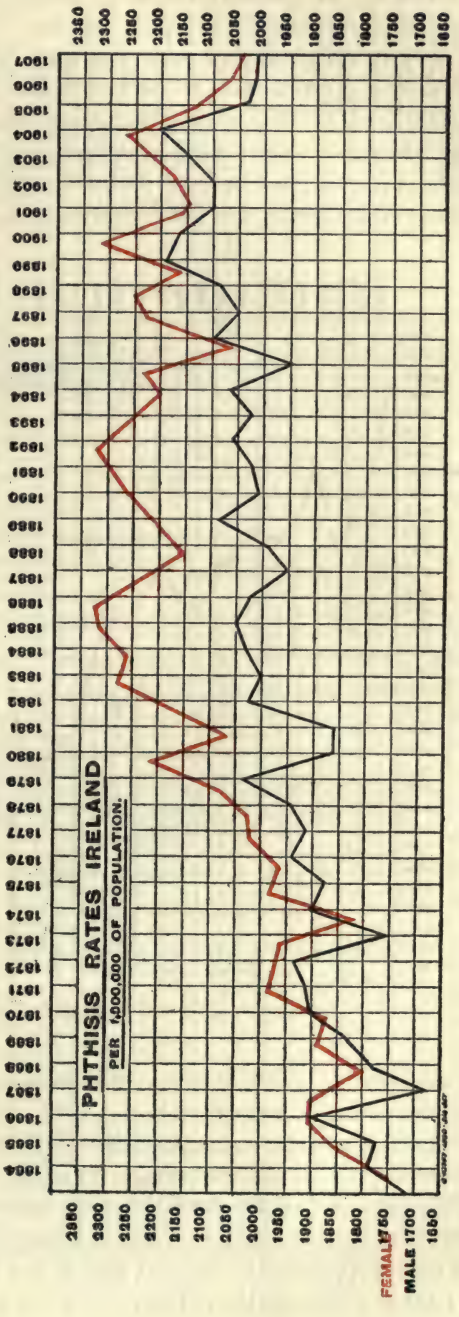
per 100,000 from phthisis has progressively declined from that day onward in a very remarkable degree. For instance, the figures for the last five decades, 1856 to 1905, and during the last two years, 1906–07, are as follows:

1856 to 1865.	1866 to 1875.	1876 to 1885.	1886 to 1895.	1896 to 1905.	1906–07.
350.7	333.9	255.3	212.9	182.7	162.7

The same table also exhibits the fact of the great decline in all forms of tuberculosis other than phthisis, which have occurred among children below

five years of age during those periods.

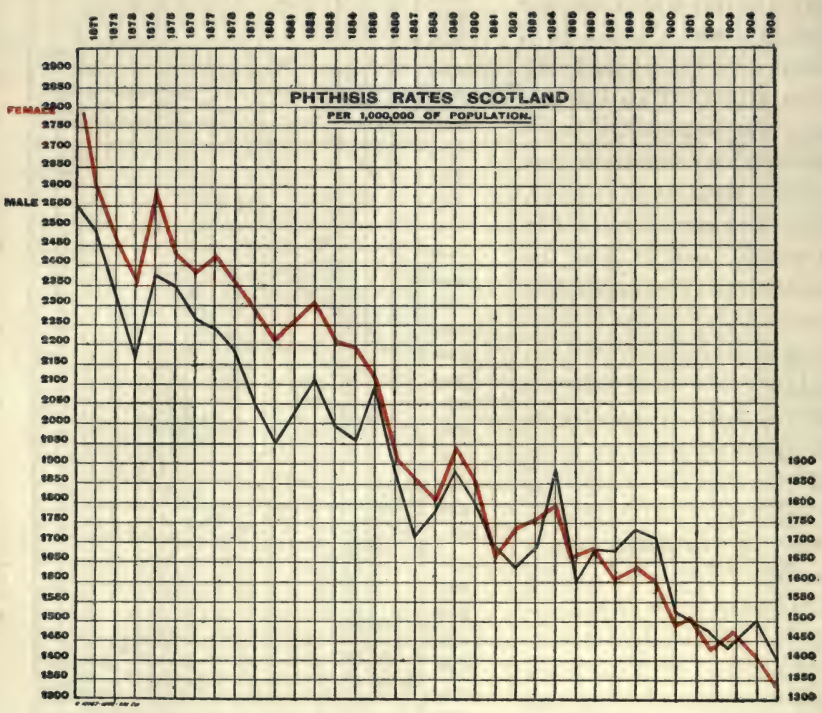
Long before the exact nature of tuberculosis was established, the disease was known to be closely associated with certain insanitary conditions, but, at the commencement of the fifty-year period over which we are glancing, and indeed to a diminishing extent for many years afterward, its importance was completely overshadowed by the more formidable rival, typhus fever, which was very prevalent in Liverpool, and it was the intention to suppress typhus fever, rather than the expectation of diminishing phthisis and other forms of tuberculosis, that led originally to the sweeping away, at great cost to the municipality, of large areas of unwholesome, ill-ventilated, and viciously constructed streets of insanitary dwelling-houses. Probably not less than 24,000 of such dwellings have been cleared away, and wholesome, airy, sunlit habitations have been erected in their stead—a work which indeed is even now in progress. There is very little reason to question the extremely important results, so far as tuberculosis is concerned, which have followed upon these measures, and it



No. 2.—Deaths per 1,000,000 in Ireland since 1864. Sexes differentiated since 1875.

is sufficient to mention them to enable an audience of experts to link together the operations and their results.

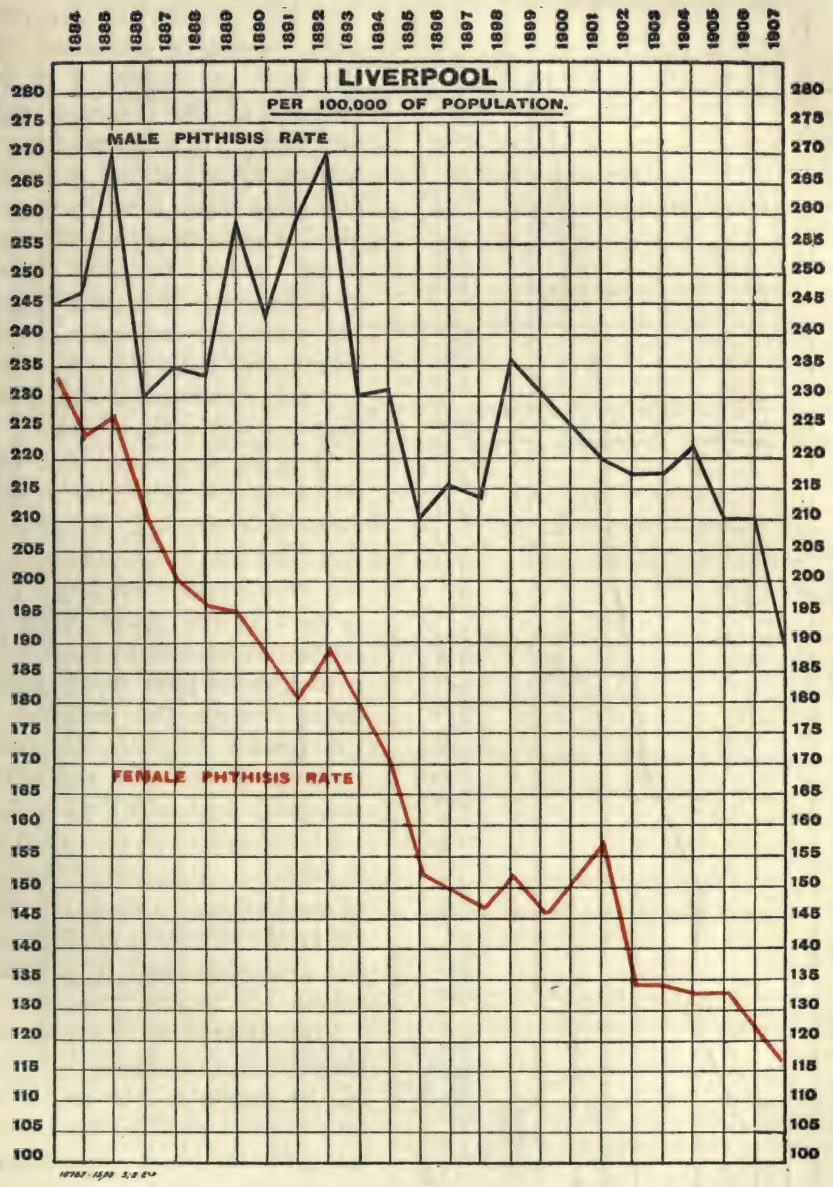
Side by side with this work, but more especially of more recent years, as the nature of the disease to be combated was appreciated, adjuncts to the ventilation of the city—wider streets, parks, gardens, and open spaces—have been provided. Facilities of transport have largely assisted in this, while personal hygiene has received its facilities from the provision of baths, wash-houses, and so forth, for the poorer classes. The supervision of schools and



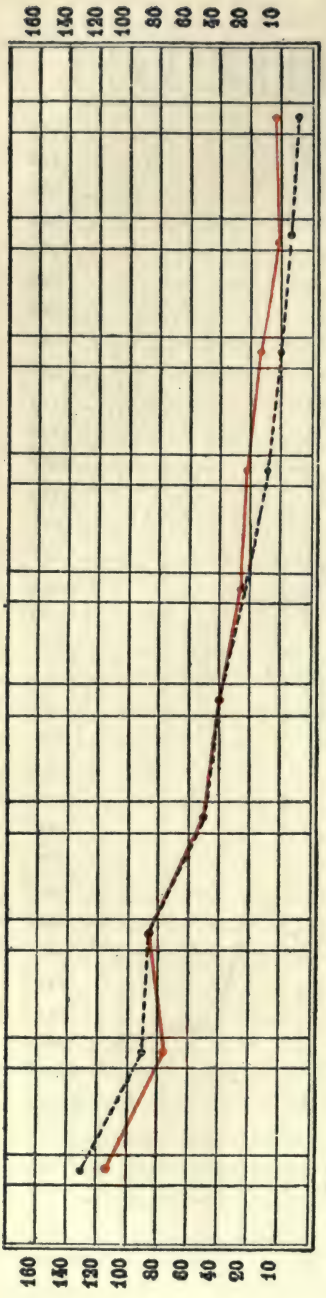
No. 3.—Deaths per 1,000 000 in Scotland since 1871. Sexes differentiated.

of work-places, coming within the scope of the Factories and Workshops Act, is exceedingly beneficial.

With regard to the supervision of those food-stuffs which may convey tubercular infection, time permits it only to be stated that the closest possible care is exercised under the Dairies, Cowsheds and Milk Shops Orders of 1885, 1886, and 1899, to insure a pure milk-supply and to safeguard the health of the cows supplying it. Special acts of the British Parliament were obtained in 1900 to authorize the officers of the city corporation to enter into any cow



No. 4.—Liverpool. Male and female deaths per 1000 since 1884.



No. 5.—Liverpool. Deaths from tuberculosis, other than phthisis, at ten age periods, comparing the deaths of the last three years (in red) with the preceding ten years (in black). *Note:* Average numbers are taken, and not rates, and on an increasing population.

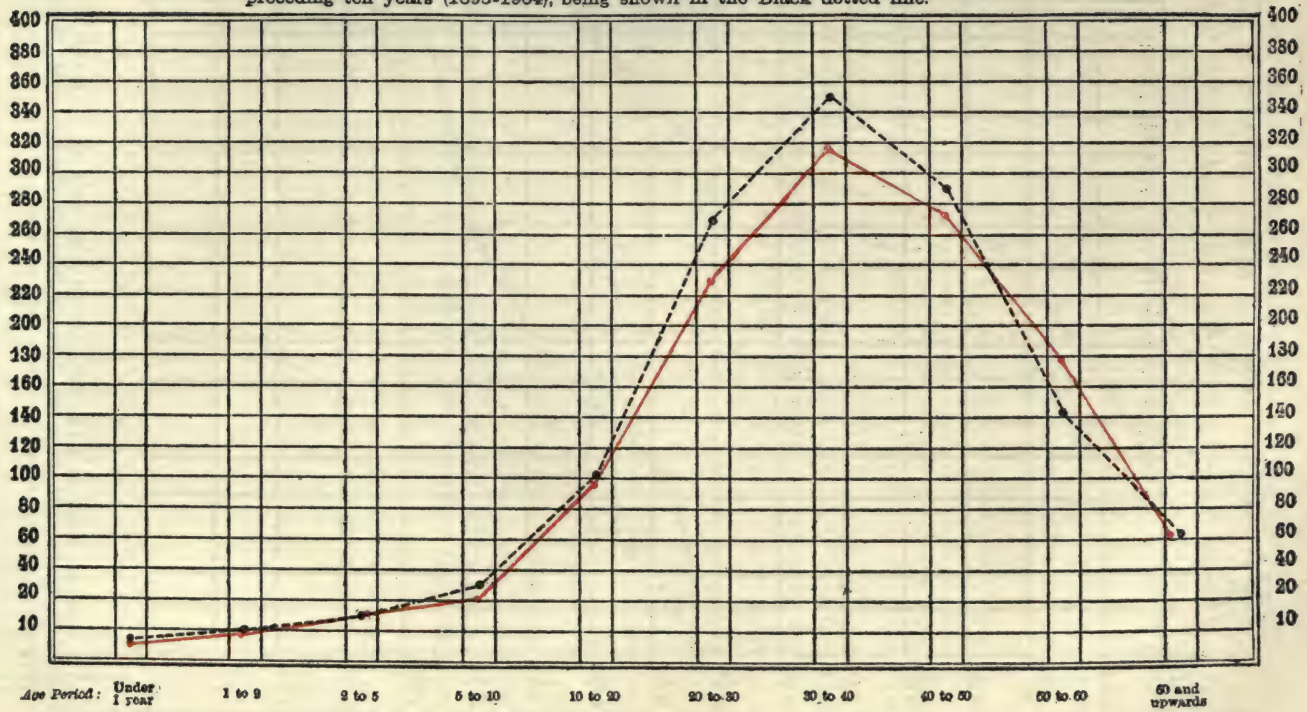
stables outside the municipal jurisdiction from which milk is sent into the city, so that cowsheds outside or within the city can now be supervised in the interests of the Liverpool milk consumer. The corporation have, with a specific object and with due limitations, themselves provided a milk-supply for the very young whose mothers cannot suckle them. The decline, and the continued decline, in tubercular diseases, other than phthisis, in young children, is shown on the diagrams and on the charts.

But the corporation of Liverpool have recognized the importance of instructing the patient and those who live with him as to the best conduct of life. For upward of ten years, cards of instruction, similar to those submitted, have been freely distributed through the medium of the general hospitals, the dispensaries for the sick, and other charitable institutions to which the infected may go for advice or assistance. A voluntary system of notification of phthisis receives the loyal coöperation of the medical profession, and is of great value.

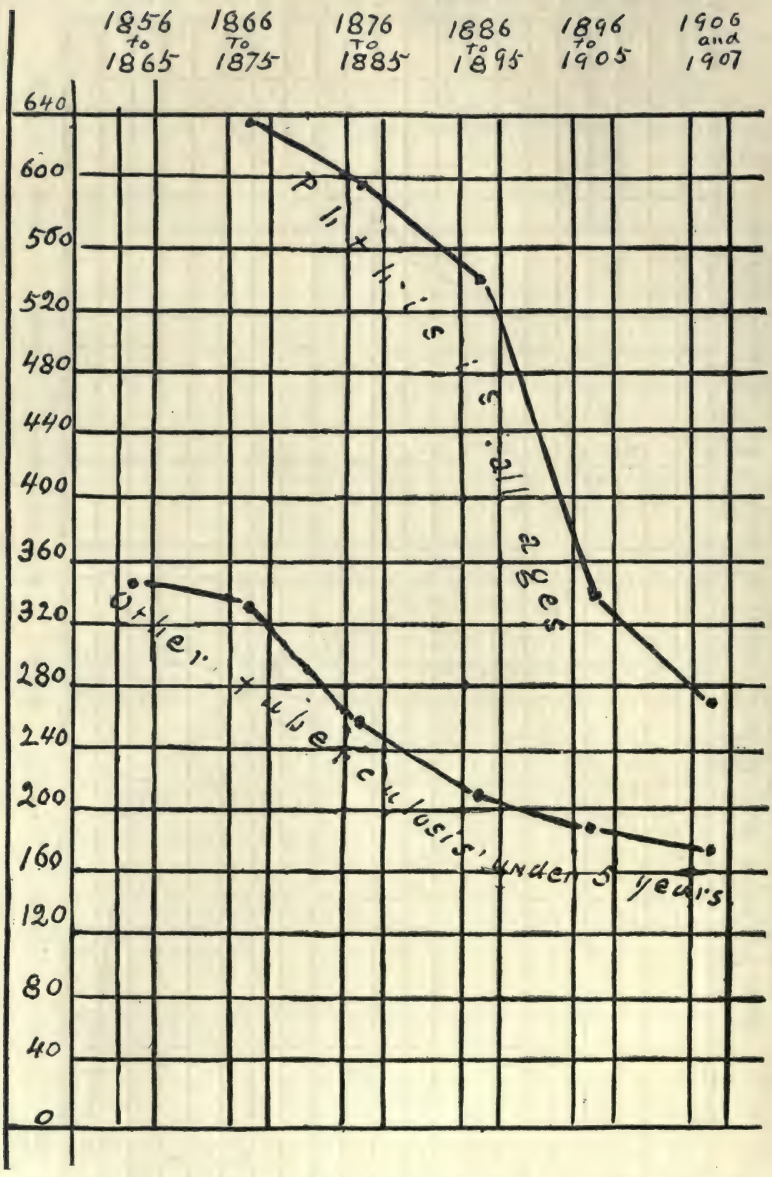
The Boards of Guardians of the City, in whose hands the relief of the destitute is placed, have established a small hospital especially for the relief of destitute consumptives who are willing to go to it, free of charge. The corporation of Liverpool have also

CITY OF LIVERPOOL.

Comparative view of the average number of Deaths from Phthisis at ten different age periods during the three years (1905-1907), shown in Red, the average for the preceding ten years (1895-1904), being shown in the Black dotted line.



No. 6.—Liverpool. Phthisis deaths at ten age periods, comparing the last three years (in red) with the preceding ten years (in black). The decline, it will be noticed, is in the earlier and working years of life, death being postponed to the later periods of life.



No. 7.—Diagram showing the annual average death-rate per 100,000, with the population at all ages, from phthisis and from tubercular diseases other than phthisis below five years of age (Liverpool).

set aside, for the last two years, a ward containing some twenty-four beds for suitable cases. Private philanthropy has erected a sanatorium in a pine wood at Delamere, near Liverpool, for the relief of sufferers who are able to pay a small sum, and it has also provided a magnificent establishment for chronic ailments of children at the summit of an elevation at Heswall, overlooking the estuary of the River Dee, in Cheshire.

These, no doubt, one and all, must be classed as accessories of value in the struggle against tuberculosis. That they will be of value is beyond question, but in no case must they be allowed to divert attention from the great public duty which devolves upon governing bodies of cities and towns, of efficiently carrying out the varied and intricate operation of sanitating the city in every direction.

It is doubtful if any more encouraging instance can be cited than the progress which has taken place in the city of Liverpool. It is undoubtedly true that from the fitful character of employment, and from many other reasons, her necessities were very great; that the fact of building thousands of insanitary dwellings constituted an experiment upon mankind of a colossal character, and that the remedying of these defects has been followed by incalculable benefit.

Decrecimiento de la Tisis y de Otras Enfermedades Tuberculosas en Liverpool.—(HOPE.)

El escrito del Dr. Hope llama la atención sobre el hecho del decrecimiento de la Tisis y otras formas Tuberculosas en la ciudad de Liverpool. Sus Cuadros indican que el decrecimiento no se confina á ninguna edad ni sexo.

Los datos se extienden á cerca de 30 años; pero los cuadros y números relativos á más recientes años, demuestran un satisfactorio decrecimiento de la Tuberculosis en los períodos de la primera edad.

Este beneficioso resultado debe concedera, como debido á las grandes operaciones sanitarias llevadas á efecto en Liverpool, y de las cuales se hace referencia y á la circunstancia de que Liverpool constituye una ilustración interesante de la ventajas de sanidad mejorada en la lucha contra la Tuberculosis.

DIE TÄTIGKEIT DER INTERNATIONALEN VEREINIGUNG GEGEN DIE TUBERKULOSE.

Von Dr. F. Helm,
Stabsarzt an der Kaiser Wilhelms-Akademie, Berlin.

Nachdem in den Neunziger Jahren des vorigen Jahrhunderts in Frankreich kurz hintereinander mehrere Kongresse zum Studium der Tuberkulose stattgefunden hatten, lag die Idee nahe, eine permanente Kommission für die Tuberkulosebekämpfung zu bilden. Dieser Gedanke wurde zum ersten Mal von dem verstorbenen Hofrat Professor von Schrötter (Wien) auf dem internationalen Tuberkulosekongress in Paris 1898 formuliert; er fand jedoch trotz wiederholter Anregungen seine Verwirklichung erst, dank den Bemühungen und dem organisatorischen Geschick des Ministerialdirektors Excellenz Althoff, auf der I. internationalen Tuberkulosekonferenz in Berlin 1902, durch die Begründung der internationalen Vereinigung gegen die Tuberkulose. Das Präsidium dieser Vereinigung übernahm der leider inzwischen verstorbene Professor Brouardel (Paris); zur Leitung der Geschäfte wurde eine Verwaltungskommission gewählt mit Excellenz Althoff (Berlin) an der Spitze und fünf Mitgliedern aus verschiedenen Ländern: Professor Calmette (Lille), Ministerialrat Chyzer (Budapest), Geheimrat Professor B. Fränkel (Berlin), Dr. Raw (Liverpool) und Marinestabsarzt Dr. Rördam (Kopenhagen). Generalsekretär der Vereinigung wurde Professor Dr. Pannwitz (Berlin); ihr Sitz ist in Berlin. Zum Abzeichen der Vereinigung wurde auf Vorschlag von Dr. Sersiron (Paris) das rote Doppelkreuz bestimmt, das sich inzwischen neben dem einfachen roten Kreuz in der ganzen Welt gut bekannt gemacht hat. Die Verwaltungskommission erfuhr im Jahre 1907 auf der Konferenz in Wien eine Erweiterung durch die Bestellung von 12 "membres adjoints" aus verschiedenen europäischen Staaten; auf der diesjährigen Konferenz in Philadelphia wurde ihre Zusammensetzung durch Beschluss des grossen Rates endgültig so festgelegt, dass sie von nun ab aus dem Vorsitzenden und 21 Mitgliedern besteht, unter denen auch Amerika durch 2 Mitglieder vertreten ist. Nach dem Tode von Brouardel wurde Léon Bourgeois (Paris) im Jahre 1907 zum Präsidenten der Vereinigung gewählt.

Die internationale Vereinigung umfasst alle Länder der Erde, in denen die

Tuberkulosebekämpfung systematisch betrieben wird; sie vereinigt in sich die Vertreter der nationalen Tuberkulosegesellschaften von 22 Staaten, in der Weise, dass, je nach der Grösse der einzelnen Länder, zwei bis fünf Mitglieder aus jedem derselben der internationalen Vereinigung als ordentliche Mitglieder angehören. Zu ihnen zählen die berufensten Vertreter der Tuberkulosewissenschaft und der praktischen Tuberkulosebekämpfung, Aerzte, Forscher, Verwaltungsbeamte, Sozialpolitiker und Philanthropen. Ihre Gesammtzahl beträgt zur Zeit 68; sie bilden zusammen den engeren Rat der Vereinigung.

Um diesen Kern gruppieren sich einerseits die Ehrenmitglieder, einige 60 an der Zahl, Männer in hervorragenden Stellungen oder von hoher wissenschaftlicher oder praktischer Bedeutung, die von ihren Landsleuten wegen ihres Interesses an der Tuberkulosebekämpfung dieser Ehre für würdig gehalten worden sind, andererseits die korrespondierenden Mitglieder, jetzt etwa 720, die, sämmtlich in der Tuberkulosebekämpfung wissenschaftlich oder praktisch tätig, auf Vorschlag ihrer nationalen Komitees von dem engeren Rat erwählt werden. Die Gesammtheit aller Mitglieder bildet den grossen Rat der Vereinigung, der alle 3 Jahre einmal zusammentritt, während der engere Rat jedes Jahr eine Konferenz abhält.

"Die internationale Vereinigung gegen die Tuberkulose verfolgt lediglich praktische Ziele. Sie ist eine Gesellschaft für angewandte Wissenschaft. Was die Wissenschaft an Fortschritten biete, die Hilfsmittel zur Ausrottung der verheerenden Volkskrankheit auszugestalten, das will sie in praktische, für den täglichen Gebrauch geeignete Formen bringen." Nicht treffender als mit diesen Worten des Generalsekretärs Professor Pannwitz lässt sich die Tätigkeit unserer Vereinigung charakterisieren. Die internationale Vereinigung bildet gewissermassen eine Tuberkuloseakademie, aber mit ausgesprochen praktischen Tendenzen. Im Besonderen sieht sie ihre Aufgabe darin, die Tuberkulosebekämpfung auf solchen Gebieten zu fördern, deren erfolgreiche Bearbeitung erst durch das Zusammenwirken mehrerer beteiligter Länder ermöglicht wird, wie z. B. die Einführung einer internationalen Statistik, das vergleichende Studium der gesetzlichen und polizeilichen Bestimmungen über die Tuberkulose, die antituberkulöse Erziehung des Einzelnen und der Massen, die Vereinigung eines zum Laienunterricht geeigneten Lehrermaterials in einem Tuberkulosemuseun u. dergl. m.

Als Mittel zur Erfüllung dieser Aufgaben dienen in erster Linie die alljährlichen Konferenzen, deren siebente soeben in Philadelphia stattgefunden hat. Im Gegensatze zu den Kongressen, auf denen jeder Teilnehmer aus seinem Arbeitsgebiete nach eigener Wahl einen Vortrag hält, werden auf den Konferenzen der internationalen Vereinigung stets eine Anzahl von Fragen, die von der Verwaltungskommission ausgewählt und eventuell durch Rundschreiben und Fragebogen wohl vorbereitet sind,

behandelt. An den jedes Jahr stattfindenden Konferenzen, die statutengemäss Sitzungen des engeren Rates sind, nehmen ausser den ordentlichen Mitgliedern doch auch regelmässig eine Anzahl von korrespondierenden Mitgliedern als Zuhörer teil, während die in jedem dritten Jahre im Zusammenhange mit dem Tuberkulosekongresse stattfindende Sitzung des grossen Rates alle Mitglieder vereinigt. Aus Rücksicht auf die Propaganda desjenigen Landes, in welchem die Konferenz stattfindet, sind alle Sitzungen der Vereinigung, mit Ausnahme der rein geschäftlichen, öffentlich.

Von speziellen Fragen, mit denen die internationale Vereinigung sich bis jetzt auf ihren Konferenzen beschäftigt hat, erwähne ich: Die Anzeigepflicht, das Verbot, auf den Boden zu spucken, die Disposition und die Heredität der Tuberkulose, die Infektionswege der Tuberkulose, die Heilstättenkosten, die Auskunfts- und Fürsorgestellen, die spezifische (Tuberkulin-) Behandlung, die Tuberkulose im Kindesalter, in der Schule, in der Armee, unter den Prostituirten, in den Gefängnissen, die antituberkulöse Erziehung, Tuberkulose und Verkehr, Tuberkulose und Recht, Tuberkulose und rotes Kreuz, die Gefahren der Infektion durch tuberkelbazillenhaltige Milch, und die Massregeln dagegen. Einzelne von diesen Fragen sind abgeschlossen, andere bedürfen noch eingehender Bearbeitung und sollen auf den nächsten Konferenzen weitergeführt werden.

Ein weiteres Propagandamittel der internationalen Vereinigung ist die Herausgabe der Monatsschrift "Tuberkulosis," die jetzt im siebenten Jahrgang mit einer Auflage von 2800 Exemplaren erscheint, die nach allen Teilen der Welt versandt werden wo immer Tuberkuloseinteressenten leben. Die "Tuberculosis" bringt mit Vorliebe Uebersichten über den Stand einer bestimmten, gerade im Mittelpunkte des Interesses stehenden Frage, die auf die Tuberkulose Bezug hat, oder Darstellungen der Tuberkulosebekämpfung in den verschiedenen Ländern, gesetzliche und polizeiliche Bestimmungen, kurze Berichte über wichtige Neuerscheinungen in der Literatur und Technik mit Bezug auf die Tuberkulose, und die offiziellen Ankündigungen, Rundschreiben und Berichte der internationalen Vereinigung. Um die Redaktion dieser Zeitschrift hat sich Professor Dr. A. Kayserling (Berlin) verdient gemacht.

Schliesslich dient auch die Geschäftsstelle der internationalen Vereinigung in besonderer Weise den Aufgaben derselben, indem sie wissenschaftliches Material sammelt und verarbeitet, den Verkehr mit den Mitgliedern unterhält und auf Wunsch über alle Tuberkuloseangelegenheiten Auskunft erteilt.

Die internationale Vereinigung legt besonderen Wert darauf, ihre Arbeiten und Beschlüsse den Behörden zu unterbreiten, um auf diese Weise die für notwendig erachteten Verbesserungen in der Gesetzgebung und Verwaltung anzuregen. So ist die im Jahre 1905 in Paris beschlossene internationale Mortalitätsstatistik dem internationalen statis-

tischen Institut übergeben worden; in Bezug auf die Mortalitätsstatistik wird eine Einigung angestrebt. So ist der Wiener Beschluss über die Anzeigepflicht allen Regierungen direkt und durch die Vermittelung der betreffenden nationalen Tuberkulosegesellschaften mitgeteilt worden.

Dasselbe geschah mit dem Resultat der vorjährigen Verhandlungen über die Infektionswege der Tuberkulose, aus denen für die Praxis der Schluss abgeleitet wurde, dass die Infektion auf verschiedenen Wegen in den menschlichen Körper gelangt, sowohl durch die Lungen, wie durch den Verdauungskanal, und dass demgemäss keine der bisher gebräuchlichen prophylaktischen Massregeln ausser Acht gelassen werden dürfte. Ebenso ist auch das in Wien angenommene Schema für die Lungenuntersuchung, die Turban-Gerhardt'sche Stadieneinteilung allen Regierungen übermittelt worden. Auch auf dem Gebiete der antituberkulösen Erziehung wurden wichtige Anregungen auf Antrag von Dr. Heron (London) an die Behörde der einzelnen Länder gerichtet. Das in Berlin begründete Tuberkulosemuseum hat sich als ein brauchbares Mittel der Volksbelehrung erwiesen und ist zum Vorbild geworden für eine Anzahl von Tuberkulosemuseen in anderen Ländern, Anstalten, die teils von den Behörden, teils von den nationalen Gesellschaften errichtet worden sind.

Zur verwaltungsmässigen Erfüllung dieser Aufgaben bedarf die internationale Vereinigung bedeutender Geldmittel, jährlich etwa 10,000 bis 12,000 Mark; dieser Betrag muss durch die jährlichen Beitragsquoten der zur Vereinigung gehörenden nationalen Gesellschaften—für jedes ordentliche Mitglied 100 Mark—oder durch freiwillige Beiträge von einzelnen Donatoren oder Tuberkulosegesellschaften gedeckt werden. Wenn es gelänge, die internationale Vereinigung durch die Unterstützung der an der Tuberkulosebekämpfung interessierten Regierungen oder durch grössere Spenden hochherziger und weitblickender Gönner auf eine breitere und sicherere finanzielle Basis zu stellen, so würde das zweifellos dem humanitären Wirken der Vereinigung eine wirksame Förderung und einen erhöhten Antrieb geben.

Work of the International Antituberculosis Association.—(HELM.)

1. The International Association against tuberculosis developed from the International Central Bureau for the prevention of tuberculosis, which was founded in Berlin in 1902. It includes all the countries of the world in which a systematic warfare against tuberculosis is carried on. At the present time the number includes 22 States. It counts among its members the most eminent authorities on tuberculosis and on practical methods of combating the disease in those countries; physicians, investigators, public

officials, sociologists, and philanthropists, who are active, honorary, or corresponding members. The total membership is about 800.

2. The object of the Association is to encourage those phases of the fight against tuberculosis which require the coöperation of all the countries in the world. These include comparative studies of law and police regulations in regard to tuberculosis; notification, disinfection, segregation of advanced cases, with the taking charge of consumptives by insurance institutions, occupational hygiene, the care of the home, etc. The introduction of uniform methods of gathering tuberculosis statistics, investigations in regard to the spread of tuberculosis to other countries and races, and, finally, the scientific inquiry into the causes of tuberculosis (infection paths, heredity and predisposition, disposition, occasional causes) and of the methods of treatment.

3. The means by which these problems are to be solved are, in the first place, the annual conferences of the Association (usually a session of the Inner Council, and every third year a session of the General Council), where scientific and practical questions in regard to which circular letters may have been sent out, are discussed. The publication of the monthly periodical, "Tuberculosis," which is now in its seventh year, with a circulation of 2800, sent to every part of the world wherever there are people interested in tuberculosis; and, finally, the work of the Business Bureau of the International Association, from which information is distributed on request on every subject relating to tuberculosis.

4. A report on the work of the International Association, its discoveries and conclusions, is sent to the governments of the various countries, and thus becomes available material for improving legislation bearing on tuberculosis and the methods for carrying on the campaign.

Trabajo hecho por La Asociación Internacional Contra Tuberculosis.— (HELM.)

1. La Asociación Internacional Contra Tuberculosis, tomó su origen del Bureau Central Internacional para la Prevención de la Tuberculosis, el cual fue fundado en Berlin en 1902. Este incluye todos los paises del mundo en los cuales existe una lucha sistematica contra la enfermedad. Al presente el numero incluye 22 Estados. Cuenta entre sus miembros las autoridades mas eminentes en tuberculosis, y los métodos prácticos para combatir la enfermedad en estos paises; medicos, investigadores, oficiales públicos, sociologistas y filantropistas, los cuales son miembros honorarios ó correspondientes, el numero total de éllos es casi de 800.

2. El objeto de la Asociación es fomentar aquellas faces de la lucha contra la tuberculosis que requieren la cooperación de todas las naciones

del mundo. Esto incluye un estudio comparativo de leyes y regulaconies políticas en cuanto á la tuberculosis; notificación, desinfección, segregación de los casos avanzados, el cuidado de los tísicos por las instituciones de aseguros, higiene en las ocupaciones, el cuidado del hogar, etc. La introducción de métodos uniformes para la colección de estadisticas, investigaciones en cuanto á la propagación de la tuberculosis en os otros paises y las otras razas y finalmente, las investigaciones en cuanto a las causas de la tuberculosis, (puertas de la infección, herencia y predisposición, disposición, causas ocacionales) y los métodos del tratamiento.

3. Los medios por los cuales este problema deberá resolverse son: en primer lugar, las conferencias anuales de la Asociacion (usualmente una sesión del consejo menor, cada tres años y una sesión del consejo mayor), en donde se trata de asuntos científicos y prácticos y se discute la cuestion en cuanto á las circulares que debieran haberse enviados. La publicación de una revista mensual sobre "tuberculosis," la cual se ha publicado durante los ultimos siete años, la circulación es de 2,800 y se envia á todas las partes del mundo en donde existe un interes sobre la tuberculosis; y finalmente, el trabajo del Bureau de Negocios de la Asociación Internacional el cual distribuye informes, cuando estos son requeridas, en cada tema relacionado con la tuberculosis.

4. Una comunicación del trabajo de la Asociación Internacional; sus descubrimientos y conclusiones, son enviados á los gobiernos de los diferentes paises, y por lo tanto constituye un factor importante en el mejoramiento de las legislaciones relacionadas con la tuberculosis, y los métodos de llevar á cabo la lucha contra la enfermedad.

Travaux accomplis par l'Association Internationale Antituberculeuse.—(HELM.)

L'Association Internationale Antituberculeuse est un développement du Bureau Central International de prévention contre la tuberculose, que fut fondé à Berlin en 1902.

L'Association comprend toutes les parties du monde où une guerre systematique contre la tuberculose est faite. Actuellement 22 états en font partie. Parmi ses membres se trouvent les autorités les plus eminentes sur la tuberculose et sur les méthodes pratiques de combattre le fléau dans ces pays—des docteurs, savants, officiers publics, sociologistes, philantropistes, qui sont membres actifs, honoraires ou correspondants.

La totalité des membres est d'environ 800.

L'association a pour but d'encourager les phases de la lutte contre la tuberculose nécessitant la coöpération de toutes les nations du monde. Les moyens pour arriver à ce but sont: l'étude comparative des lois et des

règlements de police concernant la tuberculose; notification; désinfection; ségrégation de cas avancés et soin de malades phtisiques par les cosiétés d'assurance de vie; règlements hygiéniques dans les différents métiers; soins des habitations, etc.; l'introduction de méthodes uniformes pour assembler les statistiques de la tuberculose; recherches sur la propagation de la tuberculose d'un pays à l'autre; recherches scientifiques sur les causes de la tuberculose (hérédité et prédisposition, disposition, causes occasionelles) et les méthodes de traitement.

Moyens de résoudre ces problèmes:

(*a*) Une conférence annuelle de l'Association (ordinairement une séance du Petit Conseil et une Séance du Grand Conseil) où les questions scientifiques et pratiques, pour lesquelles des circulaires ont été envoyées, sont discutées.

(*b*) La publication d'une revue mensuelle sur la "Tuberculose," laquelle est maintenant dans sa septième année, avec un tirage de 2,800 exemplaires, et qui est envoyée dans toutes les parties du monde où se trouvent des personnes intéressées à la tuberculose.

(*c*) Les travaux du Bureau d'Affaires de l'Association Internationale, qui envoie sous requête des informations sur chaque sujet relatif à la tuberculose.

(*d*) Un rapport des traveaux de l'Association Internationale, de ses découvertes et de ses conclusions, est envoyé au gouvernement des différents états, fournissant ainsi de précieux matériaux pour la législation contre la tuberculose et sur les méthodes de conduire la campagne.

THE DUTIES OF THE GOVERNMENT IN THE RESTRICTION OF TUBERCULOSIS.

By Victor C. Vaughan,
Ann Arbor, Michigan.

Government is, or at least should be, an organization framed and maintained for the public good. A government should protect the rights and property of its citizens, and should secure to each individual impartial justice in all the transactions of life. In its administration it should recognize no class distinctions, and equal justice should be meted out to each and every citizen alike. Each should be given his rights, and, what is of equal importance, should be compelled to perform his duties. No one should ask or be permitted a privilege that may result in harm to the health, happiness, or prosperity of another. The good of the whole means the good of each, and harm could result to none in a perfect government; the extent to which a government succeeds in bringing about this condition of affairs is a measure of its value and its perfection.

Our national government controls our relations with foreign conntries, regulates interstate affairs, and has direct jurisdiction over certain areas. It provides a general revenue by means of the tariff and other agencies, it formulates the restrictions that may be placed on immigration, and maintains our national quarantine, by means of which we are protected from the introduction of disease. It has a public health service which has done good work not only in averting epidemics, such as that of yellow fever in New Orleans a few years ago, but has instituted scientific research, which promises to be of the greatest value to preventive medicine; and recently our government has provided for a public health service and research laboratory in which work of the highest character and of the most practical value has been done. It is to be hoped that the present laboratory of hygiene will be wisely and liberally provided for, and that it will grow into a tree the fruit of which will benefit all parts of the earth.

The best government is that which gives to its citizens, equally and without distinction, the greatest length of life under the most favorable conditions for physical, mental, and moral growth. Man is a product of evolution, and his ideas of right and wrong, of justice and injustice, of his

privileges and duties, are undergoing an evolutionary process. No stronger proof of this can be found elsewhere than in this Congress, to which men from all parts of the civilized world have come for the purpose of consulting together on the best and most efficient means of restricting that disease which, through all historical time, has been man's most relentless foe in his attempts to improve his condition. We of the present generation have seen great things in the development of our race, and none greater or more hopeful than man's release from the superstition that disease is inevitable, and that it falls upon us as a scourge. The release from this bondage is as yet only partial, but if the world moves on in the way that it has started along this line, the historian of the future will have no difficulty in proving that the citizens of this country at the beginning of the twentieth century were possessed of but little knowledge, and that they imperfectly applied that little. He will tell his readers, for instance, that out of a population of some eighty millions, from 150,000 to 200,000 die annually of tuberculosis—a preventable disease; that our national government in its capital city, under the immediate supervision of Congress, did not make until 1908 provision for a municipal laboratory in which this disease could be definitely and certainly recognized among its citizens; that in this same city, up to the time mentioned, our government permitted a considerable number of inhabitants to live and breed tuberculosis and other diseases in the miserable quarters so well described by Kober; that in this same city the greater part of the first decennium of the twentieth century had passed before any efficient move was made to protect its citizens against infection from the tubercle or other harmful bacteria, through the milk-supply or other foods; that there was no registration of tubercular individuals in the District of Columbia up to this time; that there was no adequate provision for the care of those hopelessly infected with this disease, nor for the arrest of the disease in those less seriously infected; that there was no national control or regulation of the sanitary conditions prevailing on the great interstate lines of transportation; that every visitor to the national capitol from near and from afar ran the risk of infection alike in the day coach and in the inartistic, overcrowded, overfurnished, and often filthy and possibly infected sleeping cars; that in this same city the industrious poor were compelled to live and work under conditions that favor infection with the tubercle bacillus, and that the shiftless, careless, indifferent, and ignorant were permitted not only to live under the conditions that breed the infection, but to scatter it after they have acquired it; that up to the year 1908 our national health service had not been raised to the dignity of a bureau, that its authority and facilities for practical work were too limited and circumscribed, and that the allowance granted this service for research and investigation was a mere pittance. These and many other things along the same line the historian

of the future may bring forward to show that our civilization is, after all, a thinly veneered form of barbarism.

Please do not understand from what I have said that I am a pessimist, for such I surely am not, but we must see and appreciate our weakness if we are to relieve ourselves of it and grow stronger. This crusade against tuberculosis is the greatest work that man has so far attempted. We of this generation are starting it, and those who come after us will, we hope, complete it. I certainly believe that the time will come when tuberculosis will no longer curse the race. How soon this time will come it would be folly to predict, for that depends upon the intelligence and earnestness of the effort that is put into the work. The eradication of this disease is by no means solely the medical man's problem; it demands the combined intelligence and labor of all men who are interested in the welfare of the race, and the individual who regards it with indifference should find no place in our legislative halls, either national or State. To take the life of a fellow-man wilfully or maliciously is murder—the greatest of all crimes; to do so through ignorance or carelessness is manslaughter. In effect it is the same as murder, although in guilt it may be less heinous. The great majority of deaths from tuberculosis are due to manslaughter, and this fact should be recognized. The man who carelessly or ignorantly expectorates infected sputum, which, after drying, may be inhaled and may infect another, is guilty of manslaughter. The same is true of the dairyman who sells infected milk, or of the owner who lets an infected house. It is essential that we recognize these truths before we can be successful in our crusade against tuberculosis. The man who would put arsenic in milk or drinking-water would be regarded by the law as either a criminal or a lunatic, and in either case he would be so dealt with that he could not repeat this offense. The man who sells milk or other food infected with the tubercle bacillus or other disease-producing germs is distributing a more deadly poison than arsenic, and he should be forbidden the continuance of such a practice. We need wise laws in order to restrict and eradicate tuberculosis, and their adoption and enforcement are sure to come as soon as the mass of the people see the matter in the true light.

Among the more important things that our national government should do in the near future I may mention the following:

1. The authority, scope of work, and facilities for the accomplishment of good possessed by our public health service should be amplified.

2. While the last few years have seen a marked improvement in the inspection of immigrants to this country, this supervision should be made even more stringent, and the disease should be kept from our shores.

3. The national government should formulate and enforce regulations for interstate transportation lines for the protection of travelers against

infection. Quite properly, our national government has taken steps to control freight rates and otherwise regulate railroads and their charges, for the public good; and this control should be extended so as to compel these roads to provide against possible infection to travelers from the tubercle or any other harmful bacillus.

4. Our national government should take more stringent measures against the sale of infected food. The pure food law enacted in 1906 is a step in the right direction, but it is imperfect, both *per se* and in the provisions for its administration and enforcement. We have no means of knowing to what extent meat and dairy products consumed in this country are infected with the tubercle bacillus, and there is no reasonable comparison between the effects of this infection and the injury that may be done by a fraction of one per cent. of some preservative in food. Surely we are "straining at gnats and swallowing camels"—though this does not mean that there is any necessity of swallowing either the gnats or the camels.

5. The government that permits any individual or combination of individuals to secure a monopoly of any necessity of life, be it food, clothing, building material, fuel, light, or what not, and place an unreasonable price upon such material, is neither wise, just, nor humane. Those of us who have to do with the care and treatment of the tubercular poor know that insufficiency of nutritious food and improper housing are to-day, in this land of plenty, important factors in the development and spread of this disease.

6. Our national government should make of this, its residential city and capital, a sanitary model, and this should be demonstrated by the restriction and eradication not only of tuberculosis, but of all other preventable diseases. The vital statistics show how far this city is unlike such a model at present.

7. The Army, Navy, and Public Health Service have already demonstrated their intelligent and practical interest in this crusade against tuberculosis by the establishment and conduct of special sanatoriums in the west for the care of the tubercular in these services, and this good example should be followed and amplified, and there should be here, in the District of Columbia, not only one, but several, model institutions for the care and treatment of both incipient and advanced cases of tuberculosis. The control of dairy products and the protection of all food against infection should be demonstrated in this city, which, with its high death-rate from tuberculosis, offers excellent opportunity to those who control its affairs to show that they are worthy of the positions they hold.

8. The excellent work already done in the Hygienic Laboratory of the Public Health and Marine Hospital Service has demonstrated the wisdom of its establishment and the intelligence with which it has been administered.

Its facilities should be greatly increased and the promotion of investigational work should be encouraged.

These are some of the more obvious lines along which our general government should move for the good of the people. There are many other things that will need to be done in time, and possibly some that I have not mentioned should have precedence over those given.

Our State governments should place tuberculosis on the list of diseases dangerous to the public health, require that all cases be reported, and the local health authorities should see that the disease is not disseminated. I do not think that any medical man holds that the homes of the tubercular should be placarded or quarantined, but the tubercular individual should be minutely and carefully instructed as to the care that he must take with his excretions, in order that he may not transmit the disease to others, and there is no other place where such instructions can be better given than in properly equipped and wisely managed sanatoriums. The combination of providing suitable homes, schools of instruction or sanatoriums for the tubercular, with attempts at reforestation, as has been done in Pennsylvania, is interesting and apparently sensible. State boards of health should be removed from all political control, and should be well sustained, and when these things are done, they may accomplish much by acting in the capacity of advisors and instructors of the public. Each State should maintain, preferably at its university, a research laboratory of hygiene, as well as a laboratory for the practical examination of sputum, drinking-water, food, etc.

Much good can be done by the State antituberculosis associations, which should reach every individual in the country within a few years. There is a great field for preaching the gospel of health, and to show that if man is to be free from the shackles that disease has placed upon him he is to do so by his own intelligent exertions.

Municipal governments must provide hospitals and sanatoriums for their incurable cases of tuberculosis. In every city there should be one or more dispensaries, and no one suffering from tuberculosis should be permitted to go without the care and attention demanded by the enlightened sympathy which should pervade all people.

Debers del Gobierno General en la Restricción de la Tuberculosis.—(VAUGHAN.)

Los Gobiernos se forman para asegurar la propiedad y vida de sus ciudadanos. El Gobierno protege la propiedad y vida de sus cuidadanos contra los enemigos extrangeros. Los ciudadanos confian su propiedad al comercio del mundo; sus buques visitan y dacen comercio en cualquier puerto de la

tierra, y su mercancía está segura en cualquier país civilizado. En su tierra él está libre de ataque de aquellos que pertenecen á otros países, y hasta tanto se comporte bien puede viajar al rededor del mundo sabiendo que el fuerte brazo de su gobierno y las leyes de la equidad que prevalecen entre las naciones, le dan seguridad de propiedad y vida. En su hogar está protegido contra la ilegalidad de su propio país, y el mejor gobierno es aquel que imparte justicia y equidad imparcialmente entre sus ciudadanos, sin descriminación en favor de clase ó individuo. El gobierno mantiene una armada para la protección de la propiedad y vidas de sus ciudadanos contro posibles enemios estranjeros, y para la supresión de huelgas y rebeliones entre sus propios límites. En los Estados Unidos de America el gobierno general regula el comercio entre los estados y se esfuerza en proteger los ciudadanos de un estado contra el fraude que puede atentarse por aquellos que viven ó hacen negocio en otres estados. Todo esto es propio y discreto, y el gobierno que haga menos que eso es un fracaso y la continuación de su existencia no puede justificarse; pero en esta edad de luz un gobierno debe hacer mas de eso. La Ciencia ha demostrado que las infermedades son uno de los más destructivos agentes de la propiedad y la vida, y que muchas enfermedades pueden ser prevenidas. Por consecuencia, el gobierno que no haga todo esfuerzo posible para proteger la propiedad y vida de sus ciudadanos contra las enfermedades no está cumpliendo su deber. La tuberculosis es la más fuerte destructora de propiedad y vidas. De 150,000 á 200,000 ciudadanos de este país mueren anualmente de está emfermadad, y las pérdidas financieras que se derivan de la enfermadad y muerte por está causa están fuera de todo cálculo; esto sin decir nada de la deterioración física, mental y moral que acompaña á esta enfermedad. Es mi propósito en este escrito señalar algunos procederes que nuestro gobierno general debe llevar á efecto en la supresión y extinción de la tuberculosis. Aunque las investigaciones de Villemin y otros han demostrado fuera de duda la naturaleza infecciosa de la tuberculosis, y de la penosa labor de Koch resultó el descubrimiento del agente activo é infeccioso, mucho hay todavía que hacer en sentido científico antes que esta enfermedad pueda ser extinguida, y obtener éxito en está cruzada contra está enfermadad así como el éxito en toda otra empresa, depende del conocimiento de los pormenores. Someramente enumerare algunas de las cosas que, en mi opinión, nuestro gobierno general debe hacer.

La relación de la tuberculosis humana y la bovina, la de las aves y los peces, y también la relación entre los bacilos merece más exato y completo estudio. Debe investigarse la posibilidad de modificar el bacilo por el pase á traves de animales más ó ménos resistentes. Son materia de importancia, la influencia de la luz, el abundante abastecimiento de aire ó la restricción de éste, la influencia del ejercicio, de las diferentes clases de alimento en el progreso de la enfermedad en animales tuberculosos. No ha sido finalmente

decidido todavía el asunto de la herencia en la transmisión de la tuberculosis, y su importancia en el atento de acabar con la enfermedad es grande. Deben los tuberculosos engendrar ó tener niños, y si él ó ella los tienen, cual es el efecto en el curso de la enfermedad en los padres, y cual el efecto en la prole? Deben investigarse y presentarse al pueblo los hechos hasta donde se puedan averiguar. El problema de la inmunidad y la detención de la enfermedad debe proseguirse sin descanso. La influencia de la raza, edad, sexo y condition de vida en la susceptibilidad de infección y en el progreso de la enfermedad es algo en lo que debe adquirirse todo posible informe.

Es materia importante la química del bacilo y sus procductos germinales. Estos cuerpos deben estudiarse tanto químicamente como toxicologicamente. Esto solo constituye un ramo que puede ocupar muchos investigadores por años, y que solo puede llevarse á cabo por medio de extenso y costoso equipo.

La desinfección de las casas ocupadas por tuberculosos es asunto práctico de gran importancia, así como tambien lo es el de los medios por los cuales el viajero pueda él mismo protegerse mejor contra la infección.

Todos estos y muchos otros problemas que deben resolverse si la raza quiere librarse de esta enfermedad, pueden ser realizados mejor por investigadores trabajandos en laboratorios construidos, equipados y sostenidos por el gobierno general, y el goberino debe entrar en este trabajo y llevarlo á cabo, por las siguientes razones: (1) Ello es por el bienstar del público. (2) Exige el tiempo la atención de hombres que deben estar libres de la necesidad de hacer otra cosa. (3) Requerá tales gastos que puede hacerse mejor bajo reglas oficiales y á expensas del gobierno.

Die Pflichten der Regierung in der Einschränkung der Tuberkulose.—(VAUGHAN.)

Die Regierungen sind eingesetzt für die Sicherheit des Eigentums und des Lebens ihrer Bürger. Die Regierung schützt das Eigentum und das Leben ihrer Bürger gegen fremde Angriffe. Der Bürger vertraut sein Eigentum dem Welthandel. Seine Schiffe dürfen anlegen und Handel treiben in jedem Hafen der Erde und seine Güter sind in irgend einem civilisirten Lande sicher. Zu Hause ist er frei von der Gefahr, dass diese von anderen Nationen angegriffen werden und, solange er sich ordentlich benimmt, kann er um die Welt reisen, wissend, dass der starke Arm seiner eigenen Regierung und das Völkerrecht ihm Sicherheit für Eigentum und Leben geben. Zu Hause ist er gegen die Gesetzlosen seines eigenen Landes geschützt, und die beste Regierung ist jene, welche Gerechtigkeit und Gleichheit all ihren Bürgern zuteil werden lässt, ohne Ansehen der Person und des Standes. Die Regierung unterhält eine Flotte zum Schutze des Eigentums und Lebens ihrer Bürger gegen fremde Angriffe und zur Unterdrückung von Aufruhr und

Rebellion innerhalb ihrer eigenen Grenzen. In den Vereinigten Staaten von Amerika regulirt die Gemeinregierung den Binnenhandel und bemüht sich, die Bürger des einen Staates gegen Betrügereien zu schützen, die von solchen versucht werden könnten, die in anderen Staaten leben oder geschäftlich tätig sind. All dies ist in Ordnung und weise, und die Regierung die weniger als dies tut, ist nichts wert und ihr Fortbestehen kann durch nichts gerechtfertigt werden; aber in diesem erleuchteten Zeitalter sollte eine Regierung mehr als dies tun. Die Wissenschaft hat gezeigt, dass Krankheiten eine der am meisten zerstörenden von Eigentum und Leben sind und dass viele Krankheiten verhindert werden können; infolgedessen tut eine Regierung, die nicht alle möglichen Anstrengungen macht, das Eigentum und Leben ihrer Bürger zu schützen, nicht ihre Pflicht. Tuberkulose wirkt höchst zerstörend auf beides, Eigentum und Leben. Es sterben jährlich 150,000 bis 200,000 Bürger dieses Landes an dieser Krankheit, und der finanzielle Verlust durch Krankheit und Tod von dieser Ursache ist unter jeder Berechnung, nicht zu sprechen von der physischen, geistigen und moralischen Verschlimmerung, die diese Krankheit begleitet.

Meine Absicht in diesem Vortrage ist, auf einige Dinge hinzuweisen, die unsere Gemeinregierung annehmen und durchführen sollte, um Tuberkulose zu unterdrücken und auszurotten. Während die Studien von Villemin und anderen ohne jeden Zweifel die infective Natur der Tuberkulose bewiesen, und die mühsamen Arbeiten Kochs in der Entdeckung des activen Infectionserregers gipfelten, ist noch viel in wissenschaftlicher Arbeit zu tun um diese Krankheit auszurotten, und der Erfolg in diesem Kreuzzuge gegen die Krankheit hängt, sowie der Erfolg in allen grossen Unternehmungen, von der genauen Kenntnis der Details ab. Ich will in Kürze einige der Dinge aufzählen, die unsere Gemeinregierung tun sollte.

Die Beziehungen der menschlichen Tuberkulose zu der der Rinder, Vögel und Fische, auch die Beziehungen des Bazillus, verdienen gründlicheres und genaueres Studium. Die Möglichkeit, dass der Bazillus durch die Passage durch mehr oder weniger widerstandsfähige Tiere modifizirt wird, sollte ausgeforscht werden. Die Einflüsse von Licht, von zurückgehaltener oder reichlicher Luftversorgung, von Körperbewegung, von verschiedenen Arten von Nahrung auf den Fortschritt der Krankheit bei tuberkulösen Tieren sind Dinge von Wichtigkeit. Die Frage der Erblichkeit in der Übertragung der Tuberkulose ist auf keinen Fall definitiv erledigt und ihre Wichtigkeit in den Versuchen, die Krankheit auszurotten, ist gross. Darf das tuberkulöse Individuum Kinder erzeugen oder gebären? Und sollte er oder sie es tun, was ist die Wirkung des Krankheitsverlaufes auf die Eltern und was die Wirkung auf die Nachkommenschaft?

Die Tatsachen können sicher herausgefunden werden, sollten kennen gelernt und dem Volke vorgelegt werden. Das Problem der Immunität

und der Unterdrückung der Krankheit sollte bis zur Erschöpfung verfolgt werden. Die Einflüsse von Rasse, Alter, Geschlecht und Lebensbedingungen auf Empfänglichkeit für Infektion und auf den Fortschritt der Krankheit sind einigermassen im Zusammenhange mit allen möglichen Informationen, die eingeholt werden sollten.

Die Chemie des Bazillus und der Spaltungsprodukte ist eine wichtige Sache. Diese Stoffe sollten sowohl chemisch als auch toxikologisch studiert werden. Dies allein würde eine Tabellirung zustande bringen, welche viele Forscher auf Jahre hinaus beschäftigen würde, und es kann nur durch ausgedehnte und teure Einrichtungen durchgeführt werden.

Die Desinfection von Häusern, welche von Schwindsüchtigen besetzt sind, ist eine praktische Sache von grosser Wichtigkeit, und dasselbe mag von der Art und Weise gelten, durch welche sich der Reisende am besten gegen Ansteckung schützt.

Alle diese und andere Probleme, welche gelöst werden müssen, wenn die Rasse sich von dieser Krankheit befreien soll, können am besten durchgeführt werden durch Forscher, die in Laboratorien arbeiten, welche durch die Gemeinregierung erbaut, eingerichtet und erhalten werden, und die Regierung sollte daran gehen und dies Werk aus folgenden Gründen in Angriff nehmen: (1) Es wird für die öffentliche Wohlfahrt sein. (2) Wird es die Zeit und Aufmerksamkeit von Männern in Anspruch nehmen, welche von der Notwendigkeit, anderes zu tun, befreit sein sollten. (3) Es wird solche Ausgaben erfordern, dass es am besten unter speziellen, officiellen Bestimmungen und auf Regierungskosten getan werden kann.

Dr. Juan J. Ulloa, official delegate of Costa Rica, offered a resolution recommending that "the States and central governments enact laws for the obligatory notification, by physicians, of all cases of tuberculosis coming under medical observation, in order that health officers may put in operation adequate measures to prevent the spread of tuberculosis from all discovered foci." This resolution was referred to a special committee, namely, Dr. F. Montizambert, of Canada, Dr. F. Helm, of Germany, Dr. Juan J. Ulloa, of Costa Rica, Dr. Samuel G. Dixon, of Pennsylvania, U. S. A., and Dr. C. O. Probst, of Ohio, U. S. A.

The Section then adjourned to meet in joint session with Section V, and discuss:

THE LEGITIMATE EXERCISE OF POLICE POWER IN MATTERS OF PUBLIC HEALTH.

(See vol. iii, page 230.)

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

FOURTH SESSION.

Wednesday morning, September 30, 1908.

THE ADMINISTRATIVE CONTROL OF TUBERCULOSIS.

Section VI was called to order by the President, Surgeon-General Walter Wyman, on Wednesday morning, September 30th, at half-past nine o'clock.

THE ADMINISTRATIVE CONTROL OF TUBERCULOSIS IN NEW YORK CITY.

By Herman M. Biggs, M.D.,
General Medical Officer, Department of Health, City of New York.

Inaugurated as far back as 1894, the antituberculosis work of the New York City Health Department has always been a model for the health authorities of other cities, both here and abroad. The work now being carried on had its inception in a report made in 1887 by Drs. T. Mitchell Prudden, Herman M. Biggs, and H. P. Loomis, constituting a special committee appointed by the then Health Commissioner of New York City, Dr. Joseph D. Bryant. This report recommended that tuberculosis be classified as a communicable, infectious disease, and that the sanitary authorities formulate and enforce regulations for its prevention. These propositions are now so self-evident that it is surprising to know that they aroused wide-spread opposition, not only among the laity, but even among a large part of the medical profession. The Board of Health, therefore, instead of at once adopting measures to control the disease, began an extensive educational campaign, and collected valuable data covering the distribution of the disease.

By 1894 the time was ripe for inaugurating the tuberculosis campaign. The Board of Health classed pulmonary tuberculosis as an infectious, communicable disease, and required all hospitals and public institutions to report all cases under their charge. At the same time private physicians were asked to do so. In order to aid physicians in reaching an early and definite diagnosis, the Board of Health established a diagnosis laboratory, where suspected sputum was examined for physicians free of charge. The only stipulation made was that the physician should furnish the name and address of the patient. In this way many cases were notified to the authorities which could otherwise not have come to the knowledge of the health authorities.

After a time it was realized that the work of the Board of Health in no way interfered with the work of the private physicians, and in no way infringed on any rights of the individual. Physicians became more willing to coöperate, so that by 1897 the Board of Health was able to adopt a regulation requiring even private physicians to report their tuberculosis cases to the health authorities.

At the present time there is no other city in the world in which the health authorities have so thoroughly organized the tuberculosis campaign as in the city of New York. The work now being done may be summarized as follows:

1. *Compulsory Notification.*—This is absolutely essential, and constitutes the basis of the entire plan. The reported cases fall into two large groups—namely, those reported by private physicians as under their care, and those reported as not under such supervision. If the consumptive is regularly under the care of a private physician, and if the latter undertakes to see that the necessary precautions are taken to prevent the transmission of the disease to others, no further action is taken by the Board of Health. The very fact that the physician has reported the case is regarded as evidence that the physician is doing his share. If, however, the consumptive is without a home, or living in a lodging-house, or in a poorly furnished room, or in a tenement-house, and is not under the care of a private physician, or if the patient is receiving charitable medical advice through a dispensary or some public institution, then all objection to the visitation and the supervision of this case by the Health Department is removed.

2. Facilities for the free bacteriological examination of sputum, to aid in the early and definite diagnosis of pulmonary tuberculosis. In New York such facilities were provided as early as 1894, and have proved an excellent means of securing notification. It is curious to see how many physicians originally reluctant to directly report their cases would not hesitate to avail themselves of these laboratory facilities, furnishing patient's name, address, etc., as required.

In New York city, in order to make the transmission of specimens of sputum to the laboratory as convenient for the attending physician as pos-

sible, depots have been established in a large number of drug-stores, where sputum bottles, blanks, etc., supplied by the Department of Health, may be obtained, and where the specimen can be left to be called for by the laboratory's messenger.

3. Free disinfection by the health authorities of rooms or apartments which have been vacated by consumptives, either by death or removal; issuing orders for renovating the apartment, where necessary. The cleaning or renovating is done by the owner or occupant of the apartment under an order from the Board of Health. The rooms are disinfected free of charge with formaldehyd gas, some of the goods are removed by the department wagons, disinfected by steam, and returned the following day, while certain infected articles which cannot be properly disinfected are destroyed.

4. Persons suffering from pulmonary tuberculosis, and not under the care of a private physician, are visited in their homes by trained nurses, who give careful verbal instruction, leave printed circulars in the native tongue of the patient, and secure complete data concerning the social condition and hygienic surroundings of the patient. The case may also be visited by a trained medical inspector, who reports whether in his judgment the case ought to be left in its present surroundings or removed to a hospital or sanatorium. If the patient constitutes a menace to others, his removal to an institution should be brought about, by force, if necessary.

5. When for any reason it is undesirable or impossible to remove a patient not under the regular care of a private physician, provision is made for having such patients visited repeatedly in their homes by trained nurses or by physicians.

6. Provision of suitable relief of various kinds for the consumptive and for his family. In New York city milk and eggs have been supplied through the special tuberculosis dispensaries. Financial and other assistance has been given to the consumptive and his family by the various diet kitchens, charitable institutions, etc.

7. The health authorities in New York city provide three classes of institutions for the care of consumptives:

(*a*) Polyclinics designed for the supervision and treatment of ambulatory cases. These at the same time act as clearing-houses to which cases may be sent for examination, and from which they may be referred to the various institutions for which the particular case is adapted. All cases remaining at home, under the supervision of a tuberculosis polyclinic, are regularly visited by a trained nurse. If able to do so, the patients are required to regularly visit the polyclinic.

(*b*) Hospitals for the care of advanced cases. At least one hospital or a pavilion of a hospital should be under the exclusive control of the health authorities to provide for the forced-in cases already mentioned. In addi-

tion to this, there should be sufficient hospital provision to care for such advanced cases among the indigent as cannot be properly cared for in their homes.

(*c*) Sanatoriums. The Department of Health of New York city has established a free sanatorium for the care of hopeful cases of pulmonary tuberculosis. The institution is planned on the inexpensive shack type, and the service of the institution is furnished almost entirely by the patients. The ratio of non-tuberculous employees to patients is as about 1 to 10. Economical but efficient administration is of prime importance.

8. Educational measures. These are of the highest importance. In New York city this feature of the campaign is attended by difficulties arising from the polyglot character of the population. Hundreds of thousands of circulars have been printed in almost a score of languages and scattered widely among the people. The public press has been called in to aid, exhibitions have been held, illustrated lectures have been given, and important work has been done through the Department of Education, both in the schools and in the lecture courses under its auspices.

9. The health authorities have issued and enforced regulations concerning consumptives in public institutions.

10. Regulations have been enacted and partly enforced prohibiting spitting in public places. This has already markedly diminished this filthy habit, and has done much to educate the public concerning the danger arising from the careless disposal of sputum.

11. Inspection of the inmates of lodging-houses and house-to-house visitation in the poorest tenement-house district. In a large city this is quite necessary, a fair number of cases of tuberculosis being thus discovered.

12. Other measures included in the campaign as carried out in New York city are:

(*a*) Taking a semi-annual census of available beds for consumptives, and of the cases at that time under treatment in public institutions in the city.

(*b*) Requesting physicians once a year by letter to give information concerning any and every patient reported by them, and whether the same is still under his care.

(*c*) Supplying sanitary cuspidors to poor patients and to various charitable societies for free distribution.

(*d*) Supplying large numbers of circulars of information printed in various languages to charitable organizations, labor unions, and other societies.

(*e*) Supplying simple, concise circulars to all the school children through the Department of Education.

(*f*) Plotting on large-scale maps (showing every house in the city) all cases of tuberculosis, thereby enabling the health authorities to discover large centers of infection.

(*g*) Attempting to secure the condemnation and purchase by the city of several areas in the tenement-house districts in which tuberculosis has been particularly prevalent, and having the areas laid out in small parks.

The feasibility of the above program is indicated by the fact that practically the entire plan is now in operation in New York city. What opposition there formerly was to the plan has disappeared as time has gone on, experience having shown that most of the objections were based on a misconception of what was to be done. Certainly, at the present time, there is hearty approval on the part of the majority of the medical profession. To the writer it seems that what has been done in New York can more easily be done elsewhere, where the population is not so polyglot. The reduction in the tuberculosis death-rate in New York city would not have been nearly as great as it has been if the determined campaign above outlined had not been waged. With a continuation of this campaign, we may confidently expect still further material reductions in the death-rate from tuberculosis.

DIE ANZEIGEPFLICHT BEI MENSCHLICHER TUBERKULOSE.

Von Regierungsrat Dr. Hamel,
Mitglied des kaiserlichen Gesundheitsamtes in Berlin.

Vorbedingung eines jeden Kampfes ist, dass man den Feind und die Stärke seines Aufenthaltes kennt. Dies gilt auch vom Kampfe gegen die Tuberkulose. Es liegt auf der Hand, dass die uns gegen die Tuberkulose zur Verfügung stehenden Kampfesmittel nur zum Teil in Kraft treten können, wenn wir über Anzahl und Verteilung der Tuberkulosefälle nicht genügend orientiert sind. So wird man namentlich neuerdings auch die von Robert Koch betonte Massnahme, die Kranken in ihrem Heim nach Möglichkeit ungefährlich für ihre Umgebung zu machen, nun doch, wo die Krankheitsfälle regelmässig zur Kenntnis der Gesundheitsbehörden gelangen, zu durchgreifender Wirksamkeit bringen können.

Das zuverlässigste Mittel, die Fälle von Tuberkulose in ausreichender Weise ausfindig zu machen, ist aber zweifellos die pflichtmässige Anzeige. Jede andere Ermittlungsweise, auch diejenige der freiwilligen Anzeige, wird mehr oder weniger lückenhaft bleiben. In dieser Erkenntnis haben denn auch die Mehrzahl der Kulturstaaten bereits eine pflichtgemässe Anzeige für Tuberkulosefälle zur Einführung gebracht. Es gilt dies in Europa, ausser für den grösseren Teil des Deutschen Reiches (nämlich Preussen, Sachsen, Baden, Oldenburg, Braunschweig und Sachsen-Altenburg), für Oesterreich und Ungarn, Italien, die Schweiz, Dänemark, Schweden, Norwegen, Spanien und Portugal. Hier in Amerika besteht eine pflichtmässige Anzeige in der Mehrzahl der grossen Städte der Vereinigten Staaten, ferner in Brasilien und ausserdem besteht sie in Queensland in Australien. Eine freiwillige Anzeige ist namentlich in mehreren Städten Grossbrittanniens und Frankreich eingeführt. Danach darf die Zweckmässigkeit der Anzeige bei der Tuberkulose heute im allgemeinen als anerkannt gelten.

Betrachtet man nun des näheren die für die verschiedenen Staaten und Städte ergangenen Vorschriften, so zeigt sich, dass der Umfang, in welchem die Anzeige für Tuberkulose vorgeschrieben ist, in den verschiedenen Ländern ein recht verschiedener ist. Einige Staaten beschränken sich darauf, nur die Todesfälle an Lungen- oder Kehlkopftuberkulose der Anzeige zu unter-

werfen; in anderen unterliegen ausserdem die Erkrankungsfälle an offener Lungen- oder Kehlkopftuberkulose, sei es im allgemeinen oder unter bestimmten Bedingungen der Anzeigepflicht. Wieder andere gehen so weit, jede Erkrankung an Tuberkulose, gleichviel welches Organ davon betroffen ist, also auch die Fälle von sogenannter chirurgischer Tuberkulose für anzeigepflichtig zu erklären.

Fragt man sich, welche die Ursachen einer so verschiedenen Handhabung der Anzeigepflicht sind, so lehrt zunächst die Erfahrung, dass fast überall, wo die Anzeigepflicht für Tuberkulose zur Einführung gebracht wurde, dies nicht ohne Ueberwindung gewisser Widerstände möglich war. Sie sind in erster Linie der Befürchtung entsprungen, dass die praktische Durchführung der Anzeigepflicht nicht ohne gewisse Härten und ohne wesentliche wirtschaftliche Nachteile für die Tuberkulösen selbst, wie auch für andere Kreise der Bevölkerung sich werde bewirken lassen. Dass solche mit der Anzeigepflicht bei Tuberkulose in der Tat in gewissem Umfange verbunden sein können, wird sich nicht läugnen lassen, und es liegt auf der Hand, dass je nach der wirtschaftlichen Gliederung der Nationen die Bedeutung dieser Schädigungen in verschiedenem Masse empfunden und beurteilt werden muss.

Im Uebrigen aber wird diejenige Nation am ehesten geneigt sein, die aus der Anzeigepflicht möglicherweise entspringenden Unannehmlichkeiten auf sich zu nehmen, bei der das Verständnis für die Bedeutung hygienischer Massnahmen und der dem Einzelnen hieraus erwachsenden Pflichten am meisten ausgebildet ist. In Betracht kommt allerdings auch der Umstand, dass einige Nationen gegenüber behördlichen Zwangsmassnahmen auf dem Gebiete der Krankheitsbekämpfung eine gewisse grundsätzliche Abneigung zeigen.

Unter diesen Umständen wird man auf eine einheitliche internationale Regelung der Anzeigepflicht in absehbarer Zeit kaum rechnen dürfen.

Immerhin dürfte in ärztlichen Kreisen über eines schon heute eine einheitliche Auffassung bestehen, nämlich darüber, dass zum mindesten alle diejenigen Tuberkulosefälle der Anzeige unterliegen müssen, von denen eine weitere Ausbreitung der Tuberkulose in besonderem Masse zu befürchten ist.

Hierunter entfallen zunächst die Todesfälle an Lungen- oder Kehlkopftuberkulose, damit die von den Verstorbenen vordem bewohnten Räume und die von ihnen benutzten Gegenstände einer gründlichen Desinfektion unterzogen werden können, sodann aber auch alle diejenigen Erkrankungen an offener Lungen- oder Kehlkopftuberkulose, in denen ein solcher Kranker seine Wohnung aufgibt oder seine eigene Umgebung in erheblichem Masse gefährdet. Denn die offenen Lungen- und Kehlkopftuberkulösen sind zweifellos weitaus die gefährlichsten Krankheitsfälle, wesentlich gefährlicher als die Tuberkuloseerkrankungen sonstiger Organe, bei welchen, wie z. B. bei der Drüsen-, Knochen- und Gelenktuberkulose, der Darm-, Nieren- und Hauttuberkulose die Möglichkeit, die Krankheit zu übertragen, an sich eine

ziemlich beschränkte ist, während eine geschlossene Tuberkulose ja eine Gefahr für die Umgebung zunächst überhaupt nicht bedeutet. Diesen Verhältnissen trägt denn auch die von der internationalen Vereinigung gegen die Tuberkulose auf der VI. internationalen Tuberkulosekonferenz 1907 in Wien gefasste Resolution in entsprechender Weise Rechnung. Sie lautet: Anzeigepflicht ist für Todesfälle an Lungen- und Kehlkopftuberkulose und beim Wohnungswechsel von Tuberkulösen einzuführen. Als erstrebenswert wird daneben bezeichnet, dass für alle Erkrankungen an Lungen- oder Kehlkopftuberkulose allmählig die Anzeigepflicht zur Einführung gelange. Als weitestgehende Forderung ist also hier nur die Anzeige der Erkrankungen und Todesfälle an Lungen- oder Kehlkopftuberkulose in Aussicht genommen, während für die anderen Formen der Tuberkulose eine Anzeige nicht gefordert wird.

Was nun die Frage anbetrifft, wer zur Anzeige verpflichtet werden soll, so ist in dieser Hinsicht zunächst darauf hinzuweisen, dass es nicht genügt, nur den behandelnden Arzt zur Anzeige zur verpflichten, denn erfahrungsgemäss nehmen Kranke mit vorgeschrittener Tuberkulose ärztlichen Rat oft nur selten, vielfach auch überhaupt nicht mehr in Anspruch. Würde man daher nur den Arzt zur Anzeige verpflichten, so würde zweifellos nicht allein nur eine Anzahl von Todesfällen, sondern namentlich auch zahlreiche solche Fälle, in denen schwerkranke Tuberkulöse die Wohnung wechseln, gänzlich unbekannt bleiben. Man wird also neben den Aerzten auch noch solche Personen verpflichten müssen, als welche in erster Linie in Betracht kommen: Haushaltungsvorstände, Krankenpfleger, Leichenbeschauer, sowie diejenigen Personen, in deren Wohnung oder Behausung der betreffende Erkrankungs- oder Todesfall sich ereignet hat. Diesen nichtärztlichen Personen wird man hierbei eine Anzeigepflicht natürlich nur insoweit auferlegen können, als sie zur Feststellung von Tuberkulosefällen geeignet erscheinen.

Erweist sich in einem Staate oder Stadt eine Verpflichtung zur Anzeige nicht als durchführbar, so wird man die freiwillige Anzeige, gegebenenfalls unter Gewährung einer Entschädigung für jede Meldung als immerhin wertvollsten Ersatz begrüssen können. Ist wie z. B. in Deutschland die Krankenfürsorge in umfassender Weise gesetzlich geregelt, so wird man ausserdem die Organe der staatlichen Arbeiterversicherung in weitem Masse für die Ermittlung von Tuberkuloseerkrankungs- und Todesfällen nutzbar machen können. Nicht minder wertvoll dürften sich ferner die Auskunfts- und Fürsorgestellen für die Aufdeckung von Tuberkulosefällen erweisen, da sie ja bei den sie aufsuchenden Kranken alle in der Familie vorhandenen Krankheitsfälle festzustellen suchen. So hat mir Dr. Freund, der Direktor der Landesversicherungsanstalt Berlin erklärt, dass seiner Ueberzeugung nach in der Arbeiterbevölkerung Berlins kaum ein Krankheitsfall vorhanden sei, der nicht zur Kenntnis der Landesversicherungsanstalt oder einer der in

Berlin vorhandenen Fürsorgestellen gelangt und demzufolge in entsprechende Behandlung genommen wird.

Zweck der Anzeige soll, wie schon eingangs gesagt wurde, sein, die Gefahr einer weiteren Ausbreitung der Tuberkulose seitens der zur Kenntnis gebrachten Fälle nach Möglichkeit zu beseitigen. Dem entspricht aber andererseits, dass auch nur dort, wo ausreichende gesetzliche Handhaben bestehen, um nach erfolgter Anzeige wirksame Bekämpfungsmassnahmen, in erster Linie eine gründliche Desinfektion in Kraft treten zu lassen, die Einführung der Anzeigepflicht berechtigt erscheint. Nicht gerechtfertigt wäre es, sie etwa rein zu statistischen Zwecken zur Einführung zu bringen, denn diese Aufgabe kann auch auf andere Weise und ohne jede wirtschaftliche Beunruhigung der Bevölkerung in ausreichender Weise durchgeführt werden.

Notification of Human Tuberculosis.—(HAMEL.)

1. Effective municipal measures for the prevention of human tuberculosis presuppose that cases of the disease are brought to the notice of the authorities.

2. In view of the fact that in most civilized countries provision is made for the reporting of tuberculous cases, the necessity of notification may be said to be generally admitted.

3. A study of the various regulations that have been enacted for the reporting of tuberculous cases shows very great differences in scope. Whereas, in some countries only cases of death from pulmonary or laryngeal tuberculosis are required to be reported, others have compulsory notification of all tuberculous diseases in every organ of the body.

4. These differences are chiefly explained by the general impression that harm would be done by extending compulsory notification to all cases of tuberculous disease. The extent to which notification is made compulsory depends on the hygienic sense of the nation.

5. Uniform international regulations for notification may therefore be expected in the near future.

6. In order successfully to combat the spread of tuberculosis it is necessary that compulsory notification apply, not only to all cases of death from pulmonary or laryngeal tuberculosis, but also to all cases of open tuberculosis of the lungs and larynx.

7. The Inner Council of the International Association for the Prevention of Tuberculosis, in a resolution passed at Vienna, in 1907, emphasized the desirability of gradually extending compulsory notification to all cases of tuberculous disease of the lungs and larynx.

8. Since patients with advanced tuberculosis rarely consult a physician, the heads of households and nurses should be obliged to report deaths from

open pulmonary or laryngeal tuberculosis, and also change of residence.

9. Where compulsory notification of tuberculous cases is found to be impracticable, voluntary notification should be introduced.

10. Supporting dispensaries for tuberculous patients, and the machinery of Government workmen's insurance, could be utilized for locating cases of tuberculosis.

Notificacion de los Casos de la Tuberculosis.—(HAMEL.)

1. Las medidas municipales efectivas para la prevencion de la tuberculosis humana, presupone que los casos de esta enfermedad deberan ser traidos al conocimiento de las autoridades.

2. La necesidad de la notificacion puede decirse es generalmente admitida.

3. El estudio de varias regulaciones para la notificacion de los casos de tuberculosis, demuestran una gran diferencia en los procedimietos; mientras que en algunos solamente se requiere la notificacion de las defunciones de los casos de tuberculosis, en otros existe una notificacion obligatoria de todas las enfermedades tuberculosis en cualquier parte que estas sean.

4. La diferencia se explica principalmente por el hecho de la creencia general de que se hace mas daño con la notificacion á los casos de tuberlosis. La extension de la notificacion obligatoria depende del sentido higienico de la nacion.

5. La notificacion por lo tanto es de esperarse en el futuro.

6. Es necesario que la notificacion obligatoria sea aplicada inmediatamente, no solamente de todos los casos de tuberculosis pulmonar o de la laringe, sino que tambien de todos los casos de lesiones abiertas de tuberculosis de los pulmones y de la laringe.

7. Ademas de esto, el Concilio Interior de la Asociacion Internacional en una resolucion hecha en Viena, en 1907, se hace ver la necesidad de extender la notificacion obligatoria de todos los casos de tuberculosis de la laringe y de los pulmones.

8. Puesto que es un hecho bien sabido que, pacientes en el periodo avanzado de la tuberculosis raramente consultan un medico, otras personas tales como las matronas de las casas o las enfermeras, debieran estar obligadas a notificar los casos de defunciones consecuentes a la tuberculosis de los pulmones o de la laringe con lesiones abiertas de la afeccion, y tambien notificar el cambio de residencia de estos pacientes si tal fuere el caso.

9. En donde la notificacion obligatoria fuere impracticable, la notificacion voluntaria debiera ser introducida.

10. Dispensarios gratis para los pacientes tuberculosos, e instituciones

del gobierno para el aseguro de los obreros, pudiera ser utilizable para averiguar los casos de tuberculosis.

Notification dans la tuberculose humaine.—(HAMEL.)

1. Les mesures municipales contre la tuberculose humaine présupposent, pour être effectives, que les autorités seront notifiés de l'existence des cas.

2. La necessité de notification peut être généralement admise.

3. L'étude des différentes régulations faites pour rapporter les cas tuberculeux montre de très grandes différences d'étendue. Dans quelques pays on rapporte seulement les morts de la tuberculose pulmonaire ou laryngéale; dans d'autres il y a notification obligatoire de toutes les maladies tuberculeuses dans tous les organes du corps.

4. Ces différences s'expliquent principalement par l'opinion général que l'on ferait du mal en étendant la notification obligatoire à tous les cas de la tuberculose. Le degré auquel on peut porter la notification obligatoire dépend des sentiments hygiéniques de la nation.

5. On peut donc s'attendre à des régulations internationales et uniformes pour la notification dans le futur non éloigné.

6. Pour combattre avec succès la dissémination de la tuberculose il faut que la notification obligatoire soit immédiate, dans tous les cas de la tuberculose ouverte des poumons et du larynx.

7. D'ailleurs, le conseil intérieur de l'association internationale pour l'émpêchement de la tuberculose, dans une résolution faite à Vienne, en 1907, appuyait sur l'avantage d'étendre peu à peu la notification obligatoire à tous les cas de la tuberculose pulmonaire et laryngéale.

8. Puisque tout le monde sait que les tuberculeux avancés ne consulte presque jamais un médecin, il faudrait contraindre d'autres personnes, comme les chefs de famille et les garde-malade de rapporter les morts de la tuberculose ouverte pulmonaire ou laryngéale et aussi changements de logis des malades de ce type.

9. Si l'on trouve que la notification obligatoire des cas tuberculeux est impraticable, l'on pouvrait introduire la notification à volonté.

10. Ou pouvrait aussi se servir du mécanisme de l'assurance des ouvriers par le Gouvernement, pour localiser les cas de la tuberculose.

THE STATUTORY CONTROL OF TUBERCULOSIS, WITH SPECIAL REFERENCE TO THE MARYLAND SYSTEM.

By Marshall Langton Price, M.D.,
Baltimore, Maryland.

The statutory control of tuberculosis is the latest of the weapons now being employed in the fight against tuberculosis. In the greater part of the world the usefulness and effectiveness of legislation may be said to be still on trial, as sufficient time has not yet elapsed for us to be able to assign a proper value to statutory control. It is, therefore, all the more important that we should first obtain accurate data concerning the application of legislation in the antituberculosis campaign, and draw definite conclusions as to its results.

All coördinated control of tuberculosis may be divided broadly into three heads. The first of these is the treatment of the sick. Prevention is, of course, secondary in this method of dealing with tuberculosis. The other methods deal with prevention proper, and, from a social standpoint, fall under two heads: first, public opinion, and, second, legislation. Under the broad heading of public opinion may be grouped the great bulk of the preventive work now being done throughout the world—in popular education, printed literature, general and individual instruction, tuberculosis exhibitions, and all the important propaganda conducted by associations, societies, and leagues banded together against the common enemy.

In order to prove the value of legislation against tuberculosis we must first show the necessity for it. Is public opinion alone capable of solving the tuberculosis problem? We must recognize at the start that public opinion is a powerful force—probably, when properly directed, the most powerful at our command in this campaign. Its greatest defects are its inconstancy and inequality.

The problem of tuberculosis is as large a one as any other problem in statesmanship, and permanent results in statesmanship have never been accomplished by the force of public opinion alone. The progress of the ship of State under public opinion is like that of a vessel in a storm—furious spurts of speed are succeeded by dead calms and adverse winds, during which the vessel may lose the ground it has gained. The ship of State directed

by the law sails under a steady wind, not making such rapid speed perhaps, but never deviating from its course, and eventually reaching its predestined goal. In effect, public opinion influences those acts that we would like to require our neighbors to perform, the law those that we are compelled to perform ourselves.

It is an unfortunate evidence of human nature that the fight against tuberculosis, like most other reforms, has begun everywhere at the wrong end. The early history of tuberculosis has been everywhere the history of the development of the sanatorium movement. This has not been so much the fault of the leaders in the campaign as the adverse force of public opinion. A cure makes a greater appeal to the public mind than prevention. The public mind prefers to deal with the concrete, rather than with the abstract, and the immediate and tangible possesses a greater attraction for the popular mind than the unknown and intangible future. The problems concerned in tuberculosis are relatively simple. It is only in the methods of meeting these problems that we find any difficulty. The elements of the problem are, first, a tuberculous person who is distributing a certain virus through channels not yet wholly understood to a second group of persons, the family, which includes all the persons in the same household with whom the patient lives, eats, and sleeps, and with whom he comes into intimate and prolonged contact; to a third group, the coworkers, with whom he is associated, though much less intimately, for probably a prolonged period; to a fourth group, also to be included among the casual contacts, associates and friends, and finally to a large and remote group, the general public. Experience has shown that tuberculosis, in the vast majority of cases, is contracted by exposure only after prolonged and intimate contact, and these conditions are practically present only in the family of a tuberculous person. We have, therefore, the *intensive* method of propagating tuberculosis found in the household and family, and of great importance, and the *extensive* method, applying to casual associates and the general public.

It is another commentary upon the general manner in which reforms are always commenced—wrong end foremost—that all the early legislation dealing with tuberculosis approached first this unimportant question of extensive propagation, applying to the general public, and, as a result of this, we have now upon the statute books and city codes of all our principal municipalities every kind and variety of antispitting laws and ordinances. We now recognize that these diffuse efforts have been productive of little effect, and that our efforts can best be directed almost exclusively to the *intensive* methods of propagation.

As soon as the question of prevention arises, we have no longer a sick individual, but a sick family. In order to make my meaning clear I will refer to this small group of individuals exposed to intensive infection as

the "tuberculous family," and to the household occupied by the patient as the "tuberculous domicile."

When our efforts are properly directed toward the "tuberculous family," we have three means at our disposal: First, the removal of the patient. This represents the preventive side of the "sanatorium problem." Second, the application of all the principles included in "public opinion" to the "tuberculous family." This includes the education and instruction of both the patient and the family. Third, measures of prevention in the household under statutory control.

When the source of infection is removed from the household, either by the removal of the patient or by his death, we still have another problem to consider, namely, the "tuberculous domicile." This problem is simple, and is met in only one way—by disinfection.

Disinfection is by no means a preventive panacea, as it concerns only what we may consider the *infective* side of tuberculosis and does not affect its communication by *contagion* or contact.

It is natural that, as the sanatorium system has been so long in vogue and is so firmly established, a large number of persons should look to the sanatorium as a means for solving the whole tuberculosis problem. To these persons it first seemed simple merely to discover the cases of tuberculosis and remove them to a hospital in the same manner as is done with cases of smallpox. An infectious disease that runs its course in two or three weeks is a very different problem to handle, however, from a disease having a duration of from three to five years. These rosy hopes soon died when it was discovered that only a very small percentage of the tuberculous population could or would receive sanatorium treatment.

Osler has estimated that 90 per cent. of persons with tuberculosis must be treated in their own homes, and I consider his estimate extremely liberal. Careful tabulation of the deaths occurring in Maryland has been made, and it has been found that the number dying in institutions of all classes has never exceeded 2 per cent. As the first position proved untenable, many of the preachers of the sanatorium doctrine now ascribe an exaggerated influence to the educational effect of sanatorium treatment. Too much stress should not be laid on this argument, for, as previously stated, the number of the tuberculous population receiving sanatorium treatment is too small to exercise a wide-spread influence upon the general population.

Having considered these general principles, I will now take up the leading features of the Maryland system.

Legislative control of tuberculosis concerns two main lines of action—(1) restriction of tuberculous infection derived from animal sources; (2) restriction of tuberculosis derived from human sources. As regards restriction of infection from animal sources, I may say, at once, that no provision

has been made by the Maryland legislature for any practical control of this mode of infection, and while I do not consider the problem by any means settled, I believe that the vast majority of cases of human tuberculosis are derived from a human source. From the standpoint of Maryland laws, the tuberculosis problem has resolved itself into the question of protecting the non-tuberculous members of the "tuberculous family." This is corollary to another aphorism, that tuberculosis practically only occurs as the result of prolonged and intimate exposure. It is evident that in order to reach the root of the matter the sanitary jurisdiction "must be brought into contact with the homes of the tuberculous patients." "Under these conditions not only are 90 per cent. of consumptives brought into relation with the sanitary authorities, but they are under surveillance at a very early stage of the disease. The particular nature of the communicability of tuberculosis makes it evident that as it is in the house that infection arises, and in the house that it is disseminated, the house must, therefore, be the proper point of attack. Though this is now being recognized and appreciated, the task of bringing the sanitary jurisdiction and the home into contact possesses so many difficulties and dangers that many sanitarians have hesitated to make any attempt to bring about such a condition. These obstructions are not insuperable, however, if it is recognized that direct relations between the State and the home are practically unnecessary. These relations may be brought about in the less direct manner. When the inevitable obstructions have been successfully surmounted, the sanitary executive will have the satisfaction of knowing that he has arrived at a point where he can put his ax to the root of the tree and need not be content with the small results to be obtained by chopping away at the branches." The necessity for the State to deal directly with the "tuberculous family" has been avoided in the Maryland law by making the physician, by statute, responsible for the safety of the family and making him the agent in carrying out the principles of State control.

The Maryland legislation against tuberculosis comprises two laws —one providing for registration and disinfection of the premises after the death or removal of a tuberculous patient, and the other, a special act providing for the institution of measures of prevention in the "tuberculous domicile." I leave out of consideration here the State law prohibiting spitting on railway trains and the several anti-spitting ordinances of Baltimore and the larger towns. Registration is, of course, fundamental in the control of tuberculosis, as it is in all other sanitary problems. Under the Maryland law the State Board of Health is required to keep a register of all persons in the State who are known to be afflicted with tuberculosis. The State Board of Health has the sole and exclusive control of this register, and is forbidden to permit its inspection

or to disclose any of its personal particulars. The persons charged with registration under the act are physicians and superintendents of institutions. Institutions are required to furnish their records on Monday of the week immediately following that in which the record has been made. Physicians are required to report within seven days. The superintendents of institutions are liable to a fine of not more than $25, and physicians to a fine of $10, for failure to comply. Householders are required to notify the local board of health within forty-eight hours of the death or removal of a tuberculous person. The apartments occupied by a consumptive are declared infected, and disinfection is mandatory upon the local health authorities. A penalty is also provided for letting for hire apartments occupied by a consumptive until they have been disinfected. These provisions are contained in Sections 56, 57, 58, 59, and 60 of the Code of Public General Laws of Maryland.

The essential provisions of the special tuberculosis act are: First, it is made the duty of every physician attending a case of pulmonary or laryngeal tuberculosis to provide for the safety of all individuals occupying the same house or apartment, and if no physician is attending such patient, this duty shall devolve upon the local health board, and all the duties made incumbent upon the physician under this law must be performed by the local board of health in all cases of pulmonary or laryngeal tuberculosis not attended by a physician, or when the physician is unwilling or unable to perform the duties specified. It is thus optional with the physician whether he performs these services or turns them over to the local health authorities. The State Board of Health furnishes a blank upon which the physician first reports the condition of the premises and makes his requisition for supplies. The State provides the supplies free of cost, in sufficient amount for one quarter in each package. After receiving the supplies the attending physician demonstrates their use and institutes all other necessary precautions concerning the patient, his family, the patient's room, and the premises. For these services the State pays $1.50. In order to make sure that the patient will carry out all reasonable precautions, a nuisance clause is inserted in the law providing that any person occupying the same house may make complaint of any tuberculous person who is improperly disposing of his sputum. The local health authorities then investigate, and serve a notice on the person offending, requiring him "to dispose of his sputum, saliva, or other bodily secretion or excretion in such a manner as to remove all reasonable cause of offense or danger." Failure to comply with this order is a misdemeanor punishable by a fine of $10. The information the physician returns includes the following in addition to the usual personal data:

Economic Data.—(*a*) Is the patient engaged in the original occupation? (*b*) Is the earning power as good as ever? (*c*) If working irregularly or at reduced wages, how long? (*d*) If totally disabled, is the patient confined to bed? (*e*) Consumption in the family history?

General Data.—(*a*) Number of children living or dead? (*b*) Are there infants or young children in the house? (*c*) If the patient is a mother, does she nurse an infant? (*d*) Does the patient habitually kiss other persons on the mouth? (*e*) Does the patient use dishes, tableware, pipes, clothing, handkerchiefs, or towels in common with other persons? (*f*) Does the patient prepare the food of the family?

Disposal of the Sputum.—(*a*) Does the patient spit upon the floor, walls, carpet, or furniture? (*b*) Does the patient spit into a spittoon used by other persons? (*c*) Does the patient spit into a handkerchief or into a paper napkin? (*d*) Into a paper sputum cup? (*e*) Into China, glass, or metal sputum-cup? (*f*) Is water, carbolic acid, or any disinfectant used in the sputum-cup?

Final Disposal of Sputum.—(*a*) Is sputum burned? (*b*) Is it thrown into water-closet or sewer? (*c*) Is it thrown away with garbage or other refuse? (*d*) Are the patient's handkerchiefs put into the wash with other clothing? (*e*) Are the patient's handkerchiefs disinfected before being laundered?

Condition of the Room.—(*a*) Is the room suitable in size, heating, and ventilation for a tuberculous person? (*b*) Are hangings, floor-coverings, and furniture such as admit of proper prophylaxis? (*c*) How are the walls finished—rough plaster, smooth plaster, wainscoting, papered, painted? (*d*) Are the walls or furniture ever wiped off with a disinfectant? (*e*) Is the room swept and dusted in an ordinary way with a feather-duster? (*f*) Are the floors ever washed with a disinfectant? (*g*) How many other persons occupy the patient's bedroom? (*h*) Does anybody share the patient's bed? (*i*) Is the patient's bedroom used as a kitchen or as a dining-room? (*j*) Do children play on the floor of the bedroom?

This law has been in operation since 1904 on an annual appropriation of $5000. During 1907 there were 2061 cases registered, of whom 1709 received supplies and 352 received no supplies. The largest cost in the execution of the law was in the issue of supplies and the fee of $1.50 to the physician. The cost of sputum-cups was at first prohibitive, so we devised a new sputum-cup and manufactured it ourselves. The cost of the supplies is as follows. The amounts given are for supplies sufficient for one quarter.

Cost of State Prophylaxis of Tuberculosis per Patient.—

75 sputum-cups	22.50	cents
1 bottle disinfectant	11.06	"
2 waterproof pockets	7.00	"
200 Japanese paper napkins	8.80	"
1 cup-holder	15.83	"
1 information book	0.90	cent
Cost per package for one quarter for one patient	66.09	cents
Cost for patient for one year	264.36	"

Approximately, $2.65 a year.

Assuming that each of these patients is attended by a physician who carries out the necessary prophylactic measures and receives a fee of $1.50, the total cost for each patient annually for the prophylactic supplies and the physician's fee will be $4.15. As there are estimated to be about 2000 new cases annually in Maryland, the total cost for supplies and physicians' fees in the State would be $8300. A very large proportion of patients, however, attend hospitals or dispensaries or are treated in the various institutions where they receive the necessary instruction, and so it is not necessary for us to pay fees in all cases registered in the office of the State Board of Health.

This law has been in operation in Maryland, as already stated, for a little less than four years. Naturally, one desires to draw some satisfactory conclusions as to its results. The important effect to be looked for is, of course, a diminished death-rate. As tuberculosis is a disease having a duration of from three to five years, it is not to be expected that legislation will have any decided effect on the death-rate in less than five years' time. I may say, with due caution and reservation, however, that the death-rate is declining very substantially in Maryland, whereas previous to 1904 there was no marked decline, the death-rate being almost stationary. By a not uncommon anomaly one of the most marked effects of the Maryland legislation has been the education of the public, and especially of the physicians. Previous to the law of 1904 physicians did not realize that they had any responsibility in the "tuberculous family" beyond caring for the patient. It is doubtful if, previous to 1904, more than 1 or 2 per cent. of the physicians in Maryland concerned themselves with the protection of members of the family. It can be authoritatively said that all the physicians now realize this obligation, or, if they do not realize it, it is impressed upon them by the families they are attending.

The following are the advantages of the Maryland law:

1. The State is brought into relation with the tuberculous patients without difficulty and without friction.

2. All classes of the population are reached.

3. The family regulation of tuberculosis is effected by dealing with the "tuberculous family," and the "tuberculous domicile," rather than the tuberculous community or individual.

4. The protection of the family is put in the hands of the attending physician, who, by his relation and long acquaintance with the family, is the only person in a position practically to accomplish it.

5. The means to make measures of prevention effective (prophylactic supplies) are furnished to the "tuberculous family" by the State.

AN ACT TO PROTECT CITIZENS OF MARYLAND FROM CERTAIN COMMUNICABLE DISEASES, ESPECIALLY TUBERCULOSIS OF THE LUNGS AND LARYNX.

CHAPTER 399, ACTS OF 1904.

SECTION 1. Be it enacted by the General Assembly of Maryland that from and after the date of the passage of this Act, any person affected with any disease whose virus or infecting agent is contained in the sputum, saliva, or other bodily secretion or excretion who shall so dispose of his sputum, saliva, or other bodily secretion or excretion as to cause offense or danger to any person or persons occupying the same room or apartment, house or part of a house, shall on complaint of any person or persons subjected to such offense or danger be deemed guilty of a nuisance, and any person subjected to such a nuisance may make complaint in person or writing to the Commissioner of Health of Baltimore city or the local health officer of any city, town or country in the State of Maryland where the nuisance complained of arises or exists and it shall be the duty of the Commissioner of Health or of any local health officer receiving such complaint to investigate, and if it appears that the nuisance complained of is such as to cause offense or danger to any person occupying the same room, apartment, house or part of a house, he shall serve notice upon the person so complained of, reciting the alleged cause of offense or danger and requiring him to dispose of his sputum, saliva or other bodily secretion or excretion in such a manner as to remove all reasonable cause of offense or danger. And any person failing or refusing to comply with orders or regulations of the Health Commissioner of Baltimore city or of the health officer of any city, town or county, requiring such nuisance to be abated, shall be deemed guilty of a misdemeanor and on conviction thereof shall be fined ten dollars, provided that the requirements of this section shall apply only to pulmonary and laryngeal tuberculosis, pneumonia, influenza and such other diseases as the State Board of Health may from time to time determine to be communicable by means of sputum, saliva, or other bodily secretion or excretion.

SECTION 2. It shall be the duty of the physician attending any case of pulmonary or laryngeal tuberculosis to provide for the safety of all individuals occupying the same house or apartment, and if no physician be attending such patient this duty shall devolve upon the local health board and all duties made incumbent upon the physician in the following sections shall be performed by the local board of health in all cases of pulmonary or laryngeal tuberculosis not attended by a physician or when the physician is unwilling or unable to perform the duties specified.

SECTION 3. It shall be the duty of the local board of health to transmit to the physician reporting any case of pulmonary or laryngeal tuberculosis a printed report after the manner and form to be prepared and authorized by the State Board of Health, naming such procedures and precautions as in the opinion of the State Board of Health are necessary or desirable to be taken on the premises of the said tuberculous case, and it shall be the duty of the State Board of Health to print and keep on hand sufficient number of such report blanks and to furnish the same in sufficient number to any local board of health upon due requisition of the latter. Upon receipt of

the blank report the physician shall fill, sign, and date the same and return to the local board of health without delay, provided that if the attending physician is unwilling or unable to undertake the precedure and precautions specified he shall so state upon his report blank, the duties herein prescribed shall then devolve upon the local board of health. Upon receipt of this report the local board of health shall carefully examine the same and if satisfied that the attending physician shall have taken all necessary and desirable precautions to insure the safety of all persons living in the house or apartments occupied by the consumptive and to insure the safety of the people of the State of Maryland, the said local board of health shall issue an order on the State Board of Health in favor of the attending physician for the sum of one dollar and fifty cents ($1.50) to be paid by the State Board of Health out of a fund hereinafter provided. If the precautions taken by the attending physician are, in the opinion of the local board of health, not such as will remove all reasonable danger or probability of danger to the persons occupying the said house or apartment the local board of health shall return to the attending physician the report blank with a letter specifying the additional precautions which they shall require him to take, and the said attending physician shall immediately take the additional precautions specified and shall return the same on the original blank to the local board of health. It shall further be the duty of the local board of health to transmit to the physician reporting any case of pulmonary or laryngeal tuberculosis a printed requisition which shall be prepared by the State Board of Health and issued in sufficient number to any local board of health upon due requisition of the latter. Upon this requisition blank shall be named the materials kept on hand by the local board of health for the prevention of the spread of the disease, and it shall be the duty of the State Board of Health to purchase such supplies as it may deem necessary from the fund hereinafter provided and to supply them to any local board of health upon the requisition of the latter. Any physician may return a duly signed requisition to the local board of health for such of the specified materials and in such amount as he may deem necessary in preventing the spread of the disease, and all local boards of health shall honor as far as possible a requisition signed by the attending physician in such case. It shall be the duty of every local board of health to transmit to every physician reporting any case of pulmonary or laryngeal tuberculosis or to the persons reported as suffering from this disease provided the latter have no attending physician, a circular of information prepared and printed by the State Board of Health and which shall be furnished in sufficient quantity to every local board of health on due requisition of the latter. This circular of information shall inform the consumptive of the best methods of cure of his disease and of the precautions necessary to avoid transmitting the disease to others.

Section 4. Any physician or person practising as a physician who shall fail to execute the duties prescribed by this act or who shall knowingly report as affected with pulmonary or laryngeal tuberculosis any person who is not so affected, or who shall wilfully make any false statement concerning the name, age, color, sex, address, or occupation of any person reported as affected with pulmonary or laryngeal tuberculosis, or who shall certify falsely as to any of the precautions taken to prevent the spread of infection shall be deemed guilty of fraud and on conviction thereof shall

be subject to a fine of one hundred dollars or to imprisonment not exceeding six months, or both fine and imprisonment in the discretion of the court.

SECTION 5. The State Board of Health shall prepare and keep on hand all the circulars, blanks and printed matter required by the preceding section and all additional printed matter necessary in executing the provisions of this act, and shall issue the same in sufficient quantity to the local boards of health on due requisition of the latter, and the said State Board of Health shall further purchase and issue upon due requisition to the local boards of health the supplies required by the provisions of this act. For the purpose of defraying the expenses of printed matter and postage, for recompensing physicians for measures of prophylaxis, and for purchasing and issuing the supplies necessary in carrying out the provisions of this act the sum of five thousand dollars ($5,000) annually or as much thereof as may be necessary is hereby appropriated, payable by the treasurer of the State upon warrant of the comptroller at such times and in such sums as may be authorized by the State Board of Health upon presentation of the proper voucher.

REGISTRATION OF TUBERCULOSIS.

CHAPTER 412, ACTS OF 1904.

SECTION 34G. Be it enacted by the General Assembly of Maryland that from and after the passage of this act the State Board of Health of Maryland shall keep a register of all persons in this State who are known to be affected with tuberculosis. The State Board of Health shall have sole and exclusive control of said register, and shall not permit inspection thereof nor disclose any of its personal particulars except to officials authorized under the laws of Maryland to receive such information.

SECTION 34H. The superintendent or other person in charge or control of any hospital, dispensary, school, reformatory or other institution deriving the whole or any part of its support from the public funds of the State of Maryland or any city, town or county in the State of Maryland, having in charge or under care of custody any person or persons suffering with pulmonary or laryngeal tuberculosis shall within forty-eight hours after recognition of such disease make or cause to be made in the manner and form prescribed by the State Board of Health a record of the name, age, sex, color, occupation, social condition and residence of the person or persons so affected, together with such information as may seem necessary or important. And all such records shall be delivered under seal of the State Board of Health on Monday of the week immediately following that in which the records were made. Any superintendent or other person charged with a duty under this section who shall fail or refuse to comply with the requirements of this section shall be deemed guilty of a misdemeanor, and on conviction thereof shall be fined not more than twenty-five dollars.

SECTION 34I. Whenever any physician knows that any person under his professional care is affected with pulmonary or laryngeal tuberculosis he shall transmit to the secretary of the State Board of Health within seven days and upon blanks provided by the State Board of Health for that purpose the name, age, sex, color, occupation, social condition and residence of

such person, and any physician failing or refusing to comply with the requirements of this section shall be deemed guilty of a misdemeanor and on conviction thereof shall be subject to a fine of ten dollars.

SECTION 34J. The apartments occupied by any consumptive shall be deemed infected and when vacated by death or removal of said consumptive occupant shall be disinfected by the board of health of the city, town, or county in which such apartments are situated. And it shall be the duty of the householder, physician, or other person having knowledge of the facts to notify the local board of health within forty-eight hours after the death or removal of a person affected with pulmonary or laryngeal tuberculosis. And any person failing to comply with the provisions of this section shall be deemed guilty of a misdemeanor and on conviction thereof shall be subject to a fine of ten dollars.

SECTION 34K. Any person who lets for hire or causes or permits any one to occupy apartments previously occupied by a consumptive, before such apartments shall have been disinfected by a board of health, shall be guilty of a misdemeanor and upon conviction thereof shall be fined twenty-five dollars.

La réglementation Statutaire contre la tuberculose en Maryland.—(PRICE.)

La réglementation statutaire, est l'arme la plus nouvelle de la lutte antituberculeuse.

Le contrôle coordiné de la tuberculose s'en divise en trois divisions. 1ière, Le gouvernement des malades; cela comprend le traitement bien que l'isolement. 2ième, Le sentiment publique: (Cela comprend l'éclaircissement publique.) 3ième, La Réglementation statutaire. Les deux dernières ont usage de prévenir, lui même. Les vices du sentiment publique sont variabilité et inconstance. La réglementation statutaire pourvoit au contrôle constant et uniforme. La tuberculose est transmise de la plupart, aux associés intimes. Dans la réglementation statutaire il faut considérer le propagation *intensif*, plus que le propagation d'une manière etendue. C'est la "*famille tuberculeuse*" et le "*domicile tuberculeux*" auxquelles il faut adresser nos tentatives.

La loi de Maryland est d'accord avec le besoin fondamental d'enregistrement. Les individus confiés aux soins d'enregistrement, sont les médecins et les institutions. Les rapports sont faits direct aux autorités d'Etat. Le secret des rapports, est protegé en loi. La désinfection après le mort ou démanagement, est un fait ordonné contre (sur) les autorités locals de santé. A louer des appartements sans désinfection, c'est un delit. Les médecins sont confiés aux soins par loi de proteger la "*famille tuberculeuse.*" En défaut d'acte par le médecin, la responsabilité encombe a la part des autorités locals de santé. Pour les offices prophylactique, l'État paie un honoraire de $1.50 (7 fr. 50 cen.). Il faut que tout les mesures pris soit recités sur une forme imprimée. Provisions pour la prophylaxie et un livre enseigne, sont

donnés sans frais, aux malades par leurs médecins. Les malades sont defendus d'exposer à danger leurs associés. La disposition inconvenant des crachats du poumon est un delit, punissable par mettre a l'amende.

Dans le systême Maryland, la plupart de la population tuberculeuse est en rapport avec le Bureau de Santé, et au degré le plus précoce de leur maladie.

Inspeccion reglementaria contra la tuberculosis en Maryland.—(PRICE.)

La inspección reglamentaria es el arma más moderna en la campaña contra la tuberculosis. La inspección coordinada de la tuberculosis se puede dividir en tres partes; 1°. Dirección de los enfermos, que, incluye el tratamiento y aislamiento de los pacientes; 2°. Opinión publica, que se refiere á la información al publico; 3°. Inspección reglamentaria. Las dos últimas hacen referencia à las precauciones convenientes. Los defectos de la opinión públic son la variabilidad y la inconstancia. La regulacion legal requiere una inspección uniforme y constante. La tuberculosis se transmite principalmente á las personas con quienes se está en más intimo contacto. En la regulación legal debriamos atender á la propagación *intensiva* antes que á la *extensiva*. El punto de ataque debe ser la *familia de los tuberculosos* y *domicilio de los tuberculosos*.

Las leyes de Maryland reunen el primer requisto, —el registro. Los encargados del registro son los médicos y las instituciones. Los informes se dan directamente á las autoridades del Estado. El secreto de los archivos es guardado por la ley. La desinfección es imperiosa para las autoridades después de una defuncion ó de una mudanza. El alquilar habitaciones que no hayan sido desinfectada es una transgresión. Los médicos son legalmente responsables de la protección de *la familia tuberculosa*. Donde los médicos no tengan jurisdicción, la junta local de Sanidad es responsable. El Estado paga á los doctores los honorarios de $1.50 por profilaxis. Se debe dar parte en forma impresa de todas las medidas tomadas. Provisiones profilácticas y un libro de instrucciones se reparten gratis á casa enfermo por conducto de su medico. Se prohibe á los enfermos el poner á sus compañeros en peligro. El descuido con respecto á los esputos es una transgresion punible que se castiga con multa.

Con el sistema de Maryland se llega al foco principal de las poblaciones que padecen de tuberculosis, desde el principio de la enfermedad.

Staatliche Controlle der Tuberculose in Maryland.—(PRICE.)

Die neueste Waffe im Feldzuge gegen die Tuberkulose ist gesetzliche (staatliche) Controlle. Coordinierte Controlle der Tuberculose kann in drei Klassen geteilt werden. Erste, Behandlung der Kranken; dies schliesst

Pflege und Isolierung ein. Zweite, Volksmeinung; dies umfasst Volksbildung. Dritte, gesetzliche Controlle; die beiden letzten behandeln Prophylaxie, speciell Verhütung. Die Volksgesinnung als Waffe hat ihre Fehler, nämlich, Wankelmut und Unbeständigkeit. Gesetzliche Regulation giebt uns fortwährende und übereinstimmende Controlle. Die Tuberculose wird meistens and ie Nächststehenden übertragen. In gesetzlicher Regulierung sollten wir die Verbreitung in engeren Kreisen mehr berücksichtigen als in allgemeinen. Der Angriffspunkt ist die schwindsüchtige Familie und deren Wohnung.

Das Gesetz Maryland's trifft die unterliegende Forderung durch Registration; die Aerzte und Anstalten sind mit der Registration betraut. Die Berichte werden direct an die Staatsbehörde gemacht, bleiben dann gesetzlich Vertrauenssache. Die locale Gesundheitsbehörde verlangt, dass nach jedem Todesfalle oder Umzug disinfizirt wird. Vermietung einer nicht disinfizirt (reinen) Wohnung wird als strafbares Benehmen angesehen. Aerzte sind gesetzlich verantwortlich für die Protection der Phthisiker. Wo Aerzte nicht handhaben können ist die Gesundheitsbehörde verantwortlich. Der Staat zahlt ein und ein halb Thaler für Anordnungen zur Verhütung. Alle getroffenen Massregeln müssen auf gedrucktem Formular der Behörde berichtet werden. Vorbauungsmittel sowie Instructions-Brochüren werden dem Patienten durch den Arzt frei zugeschickt. Patienten dürfen ihre Umgebung keiner Ansteckungsgefahr aussetzen. Unschickliche Behandlung des Speichels oder allgemeines Spucken ist gesetzlich strafbar.

Das System Maryland's erreicht somit die meisten Schwindsüchtigen oftmals im Anfangsstadium.

DISCUSSION.

Dr. Liceaga (Mexico) stated—in connection with compulsory notification, as pointed out by several of the previous speakers—that Mexico has already enacted regulations to that effect, and called the attention of the Section to the legal ordinances which have been in force in Mexico since 1903, in relation to the resolutions relative to tuberculosis adopted by the Third Sanitary Convention of the American Republics. There is now under consideration a law in regard to the admission of foreigners or immigrants, a clause of which project specifies that tuberculous patients coming from abroad shall not be admitted.

Art. 262. Those who exercise the practice of medicine are obliged to notify the Board of Health of any case confirmed or suspected, which may come to their observation, of Asiatic cholera, bubonic plague, yellow fever, typhus, typhoid fever, smallpox, varioloid, scarlatina, pulmonary tuberculosis, puerperal septic accident, or diphtheria. They should file their notices,

as soon as they form their diagnosis or suspect that their patients are suffering from any of the diseases.

Art. 272. In the manner prescribed by the respective ordinances there shall take place the disinfection of the articles that can be disinfected, as well as of the houses or apartments in which any case of the diseases enumerated in Arts. 262 and 263 have occurred. To the same ordinance will be subject the destruction of animals which may be able to carry the infection.

Art. 273. No domestic animals will be permitted in houses where occur cases of the diseases enumerated in Arts. 262 and 263, while the disease lasts and until proper disinfection has been made, during the interval prescribed in the respective ordinance.

Art. 274. It shall be compulsory for the owners of the houses where a case of the diseases enumerated in Arts. 262 and 263 takes place, as soon as the health authorities ordain it, to do all that may be necessary in his judgment, in order to remove the unhealthy conditions of said house.

Art. 276. Those suffering from infectious contagious diseases cannot be carried in vehicles of the public service.

Art. 277. A public vehicle (carriage or wagon) whiich, notwthstanding the prohibition of the former Article, has served to carry some one for hire, cannot be used again until it has been properly disinfected.

Art. 323. It is prohibited to expectorate on the cars and other vehicles in the city. Persons violating this provision shall be punished by the municipal authority with the fines fixed by the respective police power.

Prof. Dr. Robert Koch expressed his belief that the successful execution of the measures described by Dr. Biggs represents a most important feature of the war against tuberculosis. He expressed his admiration of Dr. Biggs' work in New York city, in view of the extraordinary difficulties which confront the health board in the matter of immigration, and in view of the extremely unfortunate conditions of life in the overcrowded tenement-houses. But Dr. Biggs with his organization of the New York Board of Health has conquered these difficulties, and he considers the methods carried out in New York as exemplary. The two most noteworthy of these measures are: Compulsory notification of all cases of tuberculosis; and, second, the removal by force, if necessary, of such patients as are dangerous to their immediate neighbors. He described the conditions in Germany and explained that the problem which confronts the German authorities is that of seeking out cases of tuberculosis, and of caring for them in their own homes, and, in so far as is possible, rendering them harmless. He hopes, however, that they will gradually be able to approach such measures as have been successfully carried out in New York city.

Dr. Newsholme (London) stated that the sanitary development which has been attained in New York city has caused much admiration. That the method of compulsory notification and the employment of 400 physicians in the city of New York was a fact which the English envied. That

public opinion in London would not tolerate at the present time compulsory notification, for in itself it had no other value than for statistics. He added that in England some cities have notification, but not on the same plan as the American. He was of the opinion that he did not agree that the cure of the disease was objectionable in the houses. That home visitation was the key of the situation, and that under the present conditions of living it was exceedingly difficult to undertake home treatment, but that in the future the progress that is being made in regard to construction of dwellings would warrant such a treatment. He added that, so far as the hospital system of the city of New York is concerned, New York has made great progress, as shown by the reduction of the death-rate to 6.6 per cent. He further stated that if the percentage of segregation were increased, the spreading of the disease would decrease accordingly, and that dispensary treatment was undoubtedly a powerful auxiliary. He is inclined to think that it is better to treat 600 patients a month at different intervals, than to offer treatment to 100 patients six consecutive months only. He congratulates the author of the paper and also congratulates New York for its marvelous work in this connection.

Prof. Dr. Harbitz (Norway): Under date of May 9, 1900, a special law on tuberculosis was passed in Norway. This law includes as its most important point the requirement of compulsory notification, first, of every case with infectious secretions—so-called open tuberculosis; second, of cases of death from this form. An optional notification in regard to the removal of patients was introduced and is recommended by the local boards of health and is approved by the government.

Following notification, sanitary measures are to be carried out: (1) The physician who treats the case is required to give advice in the matter of preventing the spread of infection, and to keep every case under his personal supervision. (2) Patients can be sent to a hospital at public expense, and can, if necessary, be taken by force. This is seldom resorted to. The State pays four-tenths of the care of the poor in the hospitals, the rest of the expense falling upon the cities or communities. (3) Disinfection of the lodgings or the clothing is carried out in case of death or removal. Persons can also be excluded from certain means of livelihood, as from nursing, and the selling of food products, but this is also seldom resorted to. These measures, very like the regulations of the city of New York, differ from them in that they concern the entire country.

As regards the execution of this law, it is to be noted that compulsory notification has not met with resistance; often in cases of death or removal the disinfection of the residence has been demanded by the inmates of the house. Exaggerated fear of infection has occurred here and there, but has given place to more sensible views. No cases were reported where patients

have complained of compulsory notification. The local boards of health very often demand that compulsory notification be extended to embrace changes of dwelling—the best proof that it is possible to carry out notification in accordance with the demands of humanity.

The tuberculosis law can be said to have done much good and to represent a real step in advance. Many new cases are discovered; the desire for cleanliness has increased, and physicians feel themselves bound to teach their patients ordinary rules of hygiene.

The mortality from tuberculosis of the lungs in Norway increased slowly but steadily up to 1899 and 1900, then attaining 2.8 per cent. of the living population; since then it has decreased; in 1904 and 1905 it was 2.4, and in 1906, 2.3 per cent. It is to be hoped that this result partially depends on the measures that have just been described. The reasons that the mortality has not decreased more and more rapidly are, that industry is in a stage of great development in Norway, and that communication of later years between the various parts of the country has become much better, with the attendant increased ease of spreading the infection in the west and in the north. Another reason is the emigration from Norway to America, which every year takes many thousands of men and women in their best age out of Norway, while many of those emigrants who return, return with consumption and contribute to the spread of the infection.

Dr. Theodore Altschul: In this connection, compulsory notification must include as many cases as possible. Compulsory notification is further of great importance in matters of statistics, without which we cannot arrive at true conclusions. In Austria there is no compulsory notification in cases of tuberculosis. They must, therefore, rely on the obligatory workingmen's insurance system, as was suggested by Dr. Hamel. In the second place, they can call upon their school system. The school physicians can make use of the cutaneous reaction. In the division in which such examination has been made obligatory, this reaction has given 45 per cent. positive results in children suspected of tuberculosis. He expressed his admiration of the work done by Dr. Biggs, and his hope that Austria would eventually attain to such measures.

Dr. von Mansfelde (Nebraska) wished to consider a point which had occurred to him while viewing the exhibits. Since 80 per cent. or more of the patients belong to the poorer classes, we must invent such measures and such contrivances as can be utilized by the extremely poor. He thought that we had not spent enough energy in making provision for the home treatment of such cases. He thought, further, that compulsory notification should begin with the newborn child, namely, that the authorities should be notified of the birth of a child into a home infected with the germs of tuberculosis.

Dr. Woodward (District of Columbia) stated that the reason why New York has taken the lead in this crusade is due to the fact that its board of health is invested with enormous power, which is based on the respect of the people. He added that if we only depended on education we would not be successful; that compulsion has resulted favorably; that if small municipalities had the same power as the board of health of New York city, but not the means to carry out the campaign, we would bring all methods in disrepute, for one must not only have the power, but also the means of raising the necessary moneys.

Dr. Bryce (Ottawa) said that he is also deeply interested in house supervision; he hopes that the discussion will come once more before the section. He wishes that shops and factories would be comprehended under the same supervision. By doing so we would go to the root of the matter that occupies the whole world.

Dr. Price (Maryland), in closing the discussion, wished to call the attention of the section to a tendency which is becoming common—that of overshadowing the infectious side of tuberculosis by the social and economic problems involved. He believed that the fact that tuberculosis is an infectious disease represents the central point of attack, and that this fact should be considered predominant without belittling the other factors.

Dr. Hamel (Berlin): Der Vorschlag von Herrn Sanitätsrat Altschul—Prag, auch die von den Schulärzten ermittelten Tuberkulosefälle zur Kenntnis der Behörde gelangen zu lassen, ist zweifellos sehr wertvoll. Wir können dadurch der Bekämpfung der Tuberkulose des Kindesalters, welches bisher nicht die erwünschte Abnahme der Seuche erkennen liess, einen Schritt näher kommen. In Preussen ist in dieser Hinsicht in neuerer Zeit Bestimmung dahin ergangen, dass sowohl Kinder, wie Lehrer, welche an offener Tuberkulose leiden, vom allgemeinen Schulunterricht auszuschliessen sind. Ob man freilich, wie Herr Altschul anregte, eventuell so weit gehen soll, schon jeden Fall, der auf eine Impfung nach Pirquet reagierte, der Anzeige zu unterwerfen, möchte ich noch dahingestellt sein lassen. Andererseits aber dürfte sich namentlich durch ein verständnisvolles Zusammenwirken von Schulärzten und Fürsorgestellen meines Erachtens an vielen Orten ein sehr segensreicher Nutzen erzielen lassen.

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

FIFTH SESSION.

Wednesday afternoon, September 30, 1908.

THE ADMINISTRATIVE CONTROL OF TUBERCULOSIS. ECONOMIC ASPECTS OF FREE TREATMENT.

Section VI was called to order by the President, Surgeon-General Walter Wyman, on Wednesday afternoon, September 30th, at half-past two o'clock

GEHEIMRAT PÜTTER'S INFORMATION BUREAUS AND DISPENSARIES.

PART OF AN ADDRESS BY DR. HERMANN M. BIGGS,
New York.

THEIR PURPOSE.—The purpose of the information bureaus and dispensaries (Auskunfts- und Fürsorgestellen) is to prevent the spread of pulmonary tuberculosis.

THEIR SPECIAL FUNCTIONS.—At the information bureaus and dispensaries the lungs of persons are examined free of charge. The patients are instructed as to the necessary measures to be taken against spreading tuberculosis and are cared for as circumstances require.

Medical treatment is not provided at the dispensaries, but is left to the lodges (Kassen), medical officers of the Board of Health (Armenärzte), private physicians, and the hospitals and polyclinics.

Persons already under medical treatment must, in order to be examined, bring with them a note of indorsement from their doctor.

NUMBER, LOCATION, CONSULTATION HOURS.—Districts of the dispensaries in Berlin: (1) For Berlin N. W., W., and those western suburbs that have as yet no dispensaries of their own; Royal Charite Hospital, Schumannstrasse 21, Mondays and Fridays from 4 P. M. to 6 P. M. (2) For Berlin S. W.,

S., S. E., and the southern suburbs, Neuenburgerstrasse 23 (near Alexandrinenstrasse), Wednesdays and Saturdays from 4 P. M. to 6 P. M. (3) For Berlin E. and the eastern suburbs, Pallisadenstrasse 25 (near Strausbergerstrasse), Tuesdays from 4 P. M. to 6 P. M. and Thursdays from 10 A. M. to 12 M. (4) For Berlin N. E. and the northeastern suburbs, Pallisadenstrasse 25 (near Strausbergerstrasse), Tuesdays from 10 A. M. to 12 M. (5) For Berlin N. and the northern suburbs, Luisenstrasse 8, first floor, Mondays and Fridays from 4 P. M. to 6 P. M.

THEIR MANAGEMENT.—The dispensaries in Berlin are not a municipal institution, but are under the control of a central committee, of which Geheimer Regierungsrat Pütter, who is the Administrative Director of the Royal Charite Hospital, is President.

THEIR STAFF.—In addition to the President, the staff comprises seven doctors and fourteen nurses. Special care must be taken in selecting the nurses and in instructing them in their work in connection with the dispensaries.

VOLUNTEER HELP.—The dispensaries seek for friends throughout the whole population. The assistance of the medical profession is of special importance in helping on the movement—a movement in no way injurious to their practice. Landlords profit greatly by having the sanitation of their houses investigated.

PERSONS ELIGIBLE FOR TREATMENT.—Any consumptive desiring it, whether in an early or advanced stage of the disease, whether rich or poor, can obtain advice at the dispensaries. Should any single member of a family, on examination, prove to be tuberculous, all the members of the family are required to present themselves for examination. The ever-present danger of other members of the family being affected renders it necessary, in cases of indigence, to make provision for the whole family.

THEIR WORKING PRINCIPLES.—The work of the dispensaries is a combination of hygiene and nursing. The rendering of expectorated matter innocuous and the sanitation of dwellings are included under the heading "Hygiene." We assist in the disinfection of dwellings. We train people to be clean. Our aim is to obtain for every pronounced consumptive a separate room in his home, in order to minimize the danger of infection for other members of the family and in the patient's own interest. Where necessary, we also provide a nurse. We try to improve the economic situation of the family, so that the patient may get the care and attention necessary in the treatment of tuberculosis. Where the home conditions do not permit of this, we arrange for their admission into sanatoriums (Lungenheilstätten), homes for consumptives (Heimstatte), forest convalescent homes (Walderholungestatten), and hospitals, or send them into the country.

In cases where there are children in danger of infection, and pronounced

anemia, scrofula, or inclination to catarrh appears, we arrange for their admission into various institutions, such as the children's sanatorium at Gross-Lichterfelde, near Berlin, or we send them to the mountains, the seaside, or into the country.

We remain in close touch with our patients and their families for many years, and keep an exact record concerning them.

The inquiry form for dispensaries is as follows: Statistics for the period from September 1, 1907, to March 1, 1908:

Sixty-seven thousand two hundred and forty-three persons have been examined for pulmonary tuberculosis up to March 1, 1908.

Thirty-six thousand three hundred and ninety-three homes of consumptive persons have been rendered as sanitary as possible and kept under constant supervision. This very important work of the information bureaus and dispensaries, by which the housewife is literally trained in the hygienic treatment of her family and home, has given more satisfactory results in the field of domestic hygiene than any other methods hitherto adopted. Of these dwellings, 50 per cent. to 60 per cent. were clean and healthy.

Seven hundred and forty beds have been provided in order that sick persons may not have to sleep with healthy persons. Any available couches have also been called into requisition.

Eight thousand nine hundred and twenty-seven Marks, in amounts varying from 5, 6, 7, to 10 Marks, were granted from the dispensary funds toward paying rent.

Forty-nine thousand five hundred and fifty Marks were granted to assist cases of urgent need. The Poor Commission (Armendirektion) had no share in providing the two sums of money just mentioned, although, when called upon, they have given generously in many cases.

Two thousand five hundred and two adult consumptives who had been refused by the state insurance society (Landes-Versicherungsanstalt) as incurable were sent to the information bureaus and dispensaries, according to agreement. These persons were subjected to careful observation in various ways, or to further treatment by their doctors or sent to hospitals and open-air resorts. Out of this number, 1358 persons were discharged after having considerably improved in health; these would probably have died early or fallen victims to the dread disease had they not been suitably cared for by the information bureaus and dispensaries.

Two thousand five hundred and nine children were placed in children's sanatoriums (Kinderheilstätten).

Two thousand one hundred and ninety children were placed in forest sanatoriums (Walderholungstätten).

One thousand and fifty-five persons, on account of the seriousness of their disease, were advised to enter a hospital immediately.

The number of applicants has increased of late to the rate of 10,000 persons quarterly.

SOURCE OF FUNDS.—One must distinguish between—(1) Expenses in connection with the management—salaries, rent, and other minor expenses. Funds to meet these are obtained from the amount—namely, 40,000 Marks—paid annually by the state insurance society (Landesversicherungsanstalt) of Berlin (Dr. Freund). Expenses: 25,000 Marks.

(2) The funds applied to the relief of patients and their families are raised by applications sent to the various authorities who are connected with consumptives, such, for instance, as the poor commission (Armendirektion), the post-office authorities, the railway authorities, state insurance society (Landes-Versicherungsanstalt), all state and imperial authorities (Staats- und Reichsbehorden), church authorities, all endowments, associations of various kinds, institutions, factories, and other places of business. In this way over 2,000,000 Marks were raised for our patients in the space of three and one-half years.

DISCUSSION.

DR. JAMES ALEXANDER MILLER (New York): The importanee and value of the work described by Dr. Pütter is evident, and the results which he described are certainly remarkable. Similar efforts will, of necessity, be undertaken everywhere as progress of our campaign against tuberculosis extends. It would seem to me, however, that in this country certain modifications of Dr. Pütter's plan will be necessary in order to insure the results which we would hope to obtain. It would probably be impossible at the present time to establish a salaried staff in such a manner as is done in Berlin, and it would also probably be impracticable and inadvisable to arrange for regular examinations of suspected cases of tuberculosis for any except charity patients. In New York the work which corresponds to that of Dr. Pütter in Berlin is now being done in connection with the various clinics which compose the Association of Tuberculosis Clinics of New York.

There are eleven such clinics in the city, and the city has been apportioned by districts for purposes of easy administration and for facilitating the work of the visiting nurses. By this plan cases are transferred from one clinic to another by means of a card system. In the last few years, a large proportion of this work has been devoted to the examination of the other members of the families of the patients which apply for treatment, and also for examination of suspects found by the various charitable and social workers throughout the city. In this way each clinic has become the center for expert advice and reliable information in regard to tuberculosis for each district of the city, and it is our plan to rapidly extend this work, so that many more clinics will be established, with the consequent diminution in the size of the districts,

and ultimately the provision in special clinics for all cases of tuberculosis which are not in institutions.

It will not be long, probably, before the Board of Health will be willing to promulgate the order that no case of pulmonary tuberculosis shall be treated in any but a special tuberculosis dispensary.

The Association of Tuberculosis Clinics has further strengthened its influence upon the community in New York by the formation of an associate membership, composed of the representatives of the various charity associations, social settlements, parish houses, and private individuals interested in tuberculosis, so that gradually the campaign for the control of tuberculosis in the homes of the poor is becoming centralized, and all efforts are working together toward the ultimate control of this disease among the poor.

It would seem, therefore, that in this country, at least, this work will be connected with the tuberculosis clinics, and that the matter of examination of suspected cases will thus be combined with the treatment of the cases already known to be tuberculous, and that there will not be the need for the establishment of a separate and distinct system, such as exists in Berlin.

Dr. Edward O. Otis (Boston): I desire, in the first place, to express my appreciation of this exceedingly interesting and instructive account of the work of the "Information Bureaus and Dispensaries" under the direction of Geheimrat Pütter. The extreme value of such work in the detection and prevention of tuberculosis is obvious to all.

In this country (the United States) the tuberculosis dispensaries, either alone or in coöperation with various charitable institutions, such as the Associated Charities, etc., are doing essentially the same kind of work, only their efforts are confined to those who are unable to pay a physician,—to the poor,—and medical treatment, if indicated, is included in their services. Some of these dispensaries are under State or municipal control and support, while others are supported by private charity. If a consumptive is well off, I see no reason why he should be examined free, and generally, if not always, he prefers to consult his own physician or be referrred by him to an expert, and pay for the examination.

In the city of Boston and many other cities registration with the Board of Health of all cases of tuberculosis is required by law, and the Board of Health in each instance investigates the sanitary condition of the consumptive's home. The dispensaries also have connected with them trained nurses who also visit at their homes each case of tuberculosis and give instructions as to proper hygiene and method of living, as well as the protection of the other members of the household. In our Boston tuberculosis dispensaries, and, I doubt not, in many others, the nurse, when she visits the consumptive's home, urges all the other members of the family to present themselves at the dispensary for an examination, although we have no power to require this.

When disinfection is required, this is invariably done by the Board of Health, which is considered a part of its legitimate duties. Some of our dispensaries, as the Phipps Institute of Philadelphia and the Boston Municipal Dispensary, provide food, when necessary, such as milk and eggs, while others refer the cases requiring such assistance to the various charities or diet-kitchens.

As with the Berlin dispensaries, so in ours, we provide so far as possible for the proper disposal of patients in sanatoriums, if early cases, or in hospitals, if advanced cases, unless, for one or another reason, the patient has to be treated at home.

While, with the Berlin "Information Bureaus and Dispensaries" poor aid is rendered by these institutions themselves, with our dispensaries cases requiring such aid are more generally referred to other charitable institutions, which are more or less numerous in every city. Tuberculosis associations also aid the dispensaries in the matter of obtaining aid and in many other ways.

In order to do the best for the patient as well as for the community in the way of prevention, control and continued supervision of the consumptive is most essential; he must be visited periodically if at home, or kept track of if in an institution; such continued supervision as Geheimrat Pütter's institutions exercise is perhaps the most important part of their work.

One other need, and in my opinion, a very insistent one, in the tuberculosis work, and which naturally comes under the cognizance of such dispensaries, is the provision of suitable occupation for consumptives who are able to do a certain amount of work—enough, perhaps, for their support. This I have found to be a very difficult matter. The public looks upon a consumptive, even though his disease may be arrested, as more or less of a menace, and this attitude of the public, we must confess, is largely due to our own teaching regarding the contagiousness of the disease—perhaps it was inevitable, but since such is the case to a greater or less extent, we must accept the situation and try to remedy it; perhaps it can be done by farm colonies or similar institutions, perhaps by intelligence offices in connection with the information bureaus, by means of which wholesome occupations in the country on the land can be obtained for such consumptives. Much can also be done, I believe, by the sanatoriums in training their patients, when on the road to recovery, to certain occupations for which there is a demand, such as gardeners, florists, carpenters, chauffeurs, etc. This is already being done, as we know, in some of the English sanatoriums, and perhaps elsewhere.

We have now arrived at that stage in the tuberculosis warfare when we must take the next logical step, which is to preserve the health of the consumptive whose disease has been arrested or improved, by subsequent care and supervision, and by providing him with self-supporting work which will not jeopardize the cure or improvement already attained, and in which he will not be a menace to those about him.

THE GOVERNMENT CONTROL OF TUBERCULOUS PATIENTS IN PENNSYLVANIA.

By Samuel G. Dixon, M.D.,

Commissioner of Health of the Commonwealth of Pennsylvania.

By the term "governmental" in connection with the care of tuberculous patients and the control of tuberculosis, I understand a legal, executive authority, whether national, State, municipal, military, or civil. It is used in distinction from the phrases private, charitable, or denominational, and conveys a sense of authority, which makes for the maintenance of discipline—a most important matter in the management of the tuberculous—and at the same time of abundance of resource and of permanence. A third thought which it suggests is that the recipient of the care is in no sense an object of charity, but is entitled to all that he receives by virtue of his rights as a citizen or a member of some special service.

"The governmental care of tuberculous patients in the home" of necessity implies the previous reporting of tuberculosis cases to the government by the attending physician. This measure lies at the very foundation of all governmental care of tuberculosis, and in order to produce noticeable results in the diminution of the disease, notification must be compulsory. So-called voluntary notification is a snare and a delusion. It is the weak link which invalidates the whole chain of precautionary measures. If the authorities are to check the spread of tuberculosis, they must have knowledge of every possible distributing center. Fortunately, the strong prejudice which at first existed against this requirement is breaking down. Physicians are beginning to recognize the fact that they owe a duty to the public as well as to their patients, and that, moreover, the best interests of their patients, as a component part of the body politic, are promoted by this system. The patients, too, are convinced that such reports do not become public property, and that their condition remains a close secret between the government and the physicians, except in the case of the very poor, where governmental interference becomes essential for the protection of the people at large, owing to the unfortunate conditions in which such persons are compelled to live and

their known neglect of all sanitary precautions. But while it must be compulsory in fact, it need not be so in name. There is no occasion for using or parading the word "compulsion." It grates on the American ear, and it is better to avoid it.

In the majority of cases the government will not come into relation with the patient in his home at all. The family physician will be the intermediary. He will use his influence with the patient to have all necessary precautions observed for the protection of the public, and having the confidence, good-will, often even the affection of the patient, he will be able to procure a willing and careful compliance with the official regulations. In this relation the patient who is able to employ a physician need not so much as know that there is a government. Holding these views on the subject of notification, our department has not hesitated to place tuberculosis in the list of diseases of which the report by physicians is obligatory.

Dispensaries.

Where, however, the patient's circumstances are such that it will not be possible for him to procure the nourishment which forms an essential part of the present-day treatment of tuberculosis, it may become the duty of the authorities to furnish the diet, either in whole or in part, as a measure of prophylaxis as well as cure, and the benefit thus conferred will be apt to counteract any feeling of wounded pride that may have been aroused. Such cases come, as a rule, under the head of dispensary patients. While they visit the dispensary at stated intervals and receive precise instructions from the dispensary physician as to the regulation of their daily lives, food, mealtimes, sleeping-rooms, ventilation, clothing, and similar details, the dispensary nurse visits their homes and sees that the instructions of the physician are faithfully observed even in the minutest particulars. The patient is not competent to judge as to the comparative importance of the various precautions, and cannot be trusted, therefore, to dispense with any of them.

Patients may be led, from motives of affection or pity, to share their food (milk and eggs) with others. This cannot be permitted under any circumstances, and the nurse must make this plain to the entire family as well as to the patients themselves. If other members of the family are in want, other methods of relief must be found for them. Too much depends upon the patient's receiving a maximum of nourishing food to permit this part of the treatment to be trifled with.

Patients are made to understand that the continuance of the treatment and of the privileges and advantages which accompany it are dependent upon a careful and conscientious compliance with instructions. A powerful factor in securing such compliance is education. The patients are carefully

instructed as to the nature of their disease and the reason why certain methods are adopted; and, as they will usually find more or less opposition in their homes to the systematic following of the course prescribed, the services of the visiting nurse, who will make it one of her duties to educate the family, and thus assist the patient in his efforts to persist in and patiently carry out instructions, are of the utmost importance.

One admirable method of procuring the coöperation of dispensary patients is the furnishing them with a record book in which they are expected to keep a daily record of hours of sleep, time and character of meals, hours and character of exercise, and their temperature at certain fixed hours. For this latter purpose each patient is furnished with a clinical thermometer. They become greatly interested in the keeping of this record, and it is a matter of rivalry between them to see who can make the best showing in this respect.

In Pennsylvania our dispensary system consists of sixty-seven centers, with a physician in charge and one or more assistants. The physician in charge is, as a rule, the county medical inspector. There are also one or several nurses, according to the density of the population.

The dispensaries are provided with modern instruments of precision, including in the large cities the *x*-ray apparatus, and apparatus for estimating blood-pressure. Illustrated lectures by the inspectors form a part of the system of instruction of patients. Circulars of information are also, of course, furnished for both patients and their families, and freely distributed. This is a matter which can be intrusted only to persons possessing tact and discretion—the family physician, the dispensary physician, or the trained nurse.

The corps of county medical inspectors is composed of picked men in their several counties, selected with especial reference to their skill in diagnosis and experience in the care of this disease. At least once annually they are convened in one of the large cities, and clinics in the diagnosis and treatment of tuberculosis by the most expert diagnosticians of the State are arranged for their benefit. The whole system is under the supervision of a medical inspector of dispensaries, having his desk in the office of the department in Harrisburg, but spending much of his time in traveling through the State in order to maintain the dispensaries in the highest state of efficiency.

Disinfection.

The seven hundred and thirteen health officers of the department, having jurisdiction in all the extra-urban districts of the State, will be utilized for the careful, scientific disinfection of all apartments vacated by tuberculosis patients either by removal or death. This is one of the grounds on which we insist on the reporting of all cases to the central authority.

Sanatoriums.

The question of sanatoriums is a large one. They naturally divide themselves into service sanatoriums, those which are maintained by some governmental service, as, for instance, the army, navy, or Marine Hospital Service of the United States, for the care of the enlisted men and employees of such service; life insurance sanatoriums, which are found almost exclusively in Germany; State sanatoriums maintained wholly or in part at the expense of the State; municipal sanatoriums, supported by municipalities for the care of cases occurring among their own citizens; philanthropic or denominational sanatoriums established as pure charities, and private or pay sanatoriums, carried on for the sake of pecuniary profit. With the last two classes of sanatoriums we are not concerned.

Tuberculosis farms, colonies, and camps are simply sanatoriums under special conditions.

Inasmuch as the modern treatment of tuberculosis consists primarily in prescribing a routine of daily life in the matter of food, rest, exercise, and open-air life, and is likely to prove successful just in proportion as this routine is strictly followed, governmental supervision of such enterprises, with its thorough system and rigid discipline, evidently presents great advantages. Even the hope of recovery is not always a sufficiently strong motive to induce a patient to force himself to take the necessary amount of food at sufficiently frequent intervals, or to take a perfunctory rest when his inclination is to exercise, or to admit the open air to his bed-chamber when the thermometer nears the zero point.

The regulations of such establishments should not only be strict, but should go much into detail, as it is the little things of daily life that count in this fight. But inasmuch as the conditions of patients vary from day to day, and as varying conditions require modifications of the rules, it is most important that medical supervision should be constant and careful. Even in mild cases every patient in a sanatorium should be seen by a physician every day. Of course, there are certain rules, such as those for the disposal of sputa and other body wastes, which are immutable, but even these may be susceptible of slight change in the manner of their enforcement in accordance with conditions, provided the main object is secured.

While it has unquestionably been demonstrated to the satisfaction of every one that cases of tuberculosis occasionally recover under appropriate treatment in the cities, and without leaving their homes even, yet I think no one will question that removal from the vitiated air of a city to the pure air of a mountain region of moderate altitude, softened by the balsamic exhalations of pine forests, must greatly conduce to the certainty and rapidity

of a cure. A sanatorium for tuberculosis should, therefore, never be established in or close to a city or any considerable center of population.

Inasmuch as the Pennsylvania State South Mountain Sanatorium at Mount Alto is the latest to be established, and circumstances have made it possible to introduce every feature essential to the successful treatment and comfort of the patients, and at the same time have made it imperative to plan its arrangements on a large scale, it will perhaps be pertinent and interesting if I briefly sketch the outlines of this institution.

The sum allotted by the State Legislature to the Department of Health for this object was $600,000. To this must be added a grant of land from a State forestry reservation of not more than five hundred acres on which to place it. On the other hand, something must be deducted for the purchase of a private sanatorium on ground directly adjoining that selected by the Commissioner of Health.

South Mountain is a spur of the Blue Ridge and lies a little south of the fortieth parallel of latitude. The summit is an extensive diversified plateau, having an average altitude of from 1500 to 1600 feet, well wooded, with many forests of pine. It is about ten miles distant from the city of Chambersburg, and has railroad communication as far as the foot of the mountain. The site was originally selected as an appropriate one for such a purpose by the State Forestry Commissioner, and a careful examination of the situation from every possible point of consideration showed that the choice had been an admirable one. The distance from Harrisburg, the capital of the State, is fifty-nine miles. The drive up the mountain over a good road is four miles. The settlement is, therefore, sufficiently isolated to insure quiet and privacy, while by no means difficult of access.

While the law provides for two sanatoriums, it was not considered wise to waste valuable time in seeking for a second location while providing for the immediate reception of patients at the first. Preparations are now so far advanced, however, that this problem will be at once taken up, and a site will be sought in one of the State forestry reservations west of the Allegheny Mountains.

Two thoughts have been kept especially in mind in planning for these institutions—the first, prophylaxis; the second, cure, but cure only as a means of prophylaxis. The relief of suffering is no appropriate or even allowable function of a State. Its only excuse for undertaking work of this kind is that it may conserve lives of value to the State, and prevent illness, which is a drain upon the resources of the commonwealth. When the State steps in to relieve suffering in local communities, unless in some unusual emergency, it is interfering with the rights of such communities to take care of their own poor, and drying up the founts of heaven-inspired charity at their very source.

The first object, then, was to provide for the care of the indigent consumptive in the early stage of the disease, when and when alone it is curable, and before the patient becomes a danger to others. The State government was, therefore, applied to for tents, and in a very short time, availing ourselves also of a number of shacks already on the ground, accommodations were provided for more than a hundred patients. These, however, were only designed for temporary use. The dormitory unit which it is purposed to use is a substantial frame cottage resting on concrete or brick piers, at such a height from the surface of the ground as to insure free ventilation and opportunity for thorough policing.

These cottages are nearly square, measuring 27 by 24 feet, and contain four rooms, each intended to accommodate two patients. There is a central entry or hall, 5 feet 8 inches in width. This hall is enlarged in the center for heating and lavatory purposes, by utilizing the corner spaces of the four rooms. The heating is by stoves with ventilation around the smoke flue. The surface underneath and for a distance of one foot outside is stripped of soil and sod, and filled in with cinders or coarse gravel, solidly rammed down. The cottage is one story high, with an air-space over the ceiling for ventilation. It is so arranged that each room can be thrown open abundantly to the air, with a provision of sliding shutters for protection against violent storms. No eaves or porches which would exclude the sunlight are permitted. The streets are fifty feet wide and the cottages twenty-five feet apart.

After consultation with the astronomer of the University of Pennsylvania, it was decided so to place the cottages that they should face 45 degrees south of west, which insures the sun's rays reaching each face at some period of the day all the year around. The pavilions for rest in common during the day and recreation are of the same substantial construction as the cottages. Each will be 24 by 36 in size and will accommodate twenty-four patients. The openings will be fitted with curtains of striped duck, which will roll up and down with cord and pulley.

The bath-houses, in which only showers and sprays will be used, and toilet houses will be at convenient distances proportioned to the number of patients and employees. A comprehensive system of drainage and sewage disposal has been constructed by which all pollution of the soil and undue dampness will be avoided. It having been recently demonstrated in the laboratory of our department that water into which sewage is allowed to be discharged may be contaminated with tubercle bacilli, an ample sewage purification plant will be interposed between our drainage system and the nearest stream. The water from numerous well-protected springs will be collected in a substantial, carefully guarded reservoir, and distributed over the entire inclosure.

The location of the different clusters of cottages has been determined in

two ways: first, by borings which have indicated the character of the underlying strata and the degree which the soil is saturated with moisture; and, second, by careful topographical surveys, by which have been determined with exactitude the varying levels of the plateaus and the direction of the surface drainage. The sexes will be accommodated on different plateaus about an eighth of a mile apart.

Two distinct camps have been planned, so that patients can be moved from one to the other, thus breaking the monotony of their life and providing that mental stimulus which is often so important a factor in case of invalids who are exiles from their homes. Opportunity for thorough house-cleaning and disinfection will thus also be furnished.

But the checking of the disease in its early stage and the restoration of the individual to a position of usefulness in the community, free from the taint of contagion, is only one of the duties which confront a State sanatorium. There is a large class of consumptives in the latest stage of the affection who constitute a much greater menace to the welfare of the people than those in the early stages. Their domestic circumstances, especially when they become bedridden, are such as to render them a constant danger of the most serious kind. From the point of view of prophylaxis they have an especial claim. But such patients cannot, of course, be cared for in such cottages as we have spoken of. They frequently require attention at night, and neither they nor their nurses can bear the exposure to the air at low temperature which is essential for the recovery of the other class. For these an infirmary must be provided, fitted with every comfort, in which they can end their days in comparative ease, shielded from the pangs of penury and no longer feeling themselves a danger to their loved ones. Such a building is in course of construction, and when completed, we shall be able to discharge our second duty, while at the same time we shall have incidentally the delightful consciousness that we are relieving suffering and alleviating misery. These infirmaries will naturally be placed at a safe distance from the other settlements. In addition to these, provision must also be made for surgical accidents and for intercurrent diseases. For such cases there will be a separate hospital with its own especial equipment.

Apart from the treatment of the sick, however, much can be accomplished by the central health authority in the control of public conveyances, especially of those designed for night travel, the care and disinfection of schoolhouses, the inspection of school children, and the supervision of factories, churches, and places of amusement. With these matters in view the department has been in correspondence and conference with the managers of railroads, boards of education, physicians, clergymen, officers of women's clubs, and large employers of labor throughout the State.

The particular object in seeking the coöperation of the different classes of

leaders of the people at the present time is to secure their aid in making known to those whom the information will most benefit the great opportunities now afforded by our State dispensary system.

Inspección Gubernamental de los Pacientes Tuberculosos en Pennsylvania.—(DIXON.)

Definición del término "gubernamental."

Ventajas de una supervigilancia gubernamental.

Los denuncios de tuberculosos deben ser obligatorios.

Naturaleza del cuidado clínico é inspección.

Valor de las enfermeras en el tratamiento clínico.

Sesenta y siete bien equipados dispensarios en Pennsylvania.

La desinfección atendida por setecientos trece oficiales de Sanidad.

Diferentes clases de profilaxia. Necesidad de una rígida observación de las reglas.

Descripción del "Pennsylvania South Mountain Sanatorium" para tuberculosos en Mont Alto. Arreglos para casos curables ó incipientes. Protección del público. Abastecimiento de agua, saneamiento y cloacas.

Inspección de los vehículos públicos, inspección y desinfección de las escuelas, supervigilancia de las factorías, iglesias y lugares de diversion.

Cooperación de los guías del pueblo ó individuos que se solicitan.

La Contrôle Gouvernemental des Patients Tuberculeux dans la Pensylvanie.—(DIXON.)

Définition du terme "gouvernemental."

Avantage de la surveillance gouvernementale.

La déclaration des cas tuberculeux doit-être obligatoire.

Nature du contrôle et du soin dispensaires.

Valeur des gardes-malades dans le traitement dispensaire.

Soixante-sept dispensaires de première classe.

Le soin de la désinfection entre les mains de sept-cent-treize agents de santé.

Différentes classes de sanatoriums. Importance d'une stricte observance des règlements.

Description du "Pennsylvania South Mountain Sanatorium" pour la tuberculose, à Mont Alto. Arrangements pour les cas nouveaux et curables. Protection du public. Les eaux; drainage et égouttage.

Contrôle des moyens de transports du public, inspection et désinfection des écoles, surveillance des usines, églises et lieux d'amusements.

La coöperation des chefs du people est demandée.

Die staatliche Beaufsichtigung von Tuberkulose-Patienten in Pennsylvania.—(DIXON.)

Erklärung des Wortes "staatlich."

Vorzüge der staatlichen Aufsicht.

Zwangsweises Anmelden von tuberkulösen Fällen.

Art und Controlle der Armenbehandlung in Fürsorgestellen.

Wert der Krankenpflegerinnen in der Fürsorgestellen-Behandlung.

Siebenundsechzig gut ausgestattete Fürsorgestellen in Pennsylvanien.

Desinfektion durch 713 Gesundheitsbeamte.

Verschiedene Klassen von Sanatorien. Notwendigkeit für strenges Befolgen der Regeln.

Beschreibung des Pennsylvania South Mountain Sanatoriums für Schwindsüchtige in Mont Alto. Einrichtungen für beginnende und heilbare Fälle: Schutz des Publikums.

Die Versorgung mit Wasser, Drainage- und Kloakenanlage.

Beaufsichtigung der öffentlichen Transportgelegenheiten. Inspektion und Desinfektion der Schulen, Aufsicht über Fabriken, Kirchen und Vergnügungsplätze.

Mitwirkung der Führer des Volkes ersucht.

DISCUSSION.

DR. HOLTON (Vermont): So completely has Dr. Dixon treated the subject of governmental control of tuberculosis that any discussion of the subject must necessarily be simply to emphasize certain portions of it.

The first and most important thing to be done in attempting to stamp out any communicable disease is to have full knowledge of when and where it exists. Attempts to conceal these facts, if successful, will render futile such efforts. We have had for several years in our State a law requiring every physician to report to the secretary of the State Board of Health every case of tuberculosis within one week after it comes under his professional care. A failure to do so is declared to be a misdemeanor and punishable by fine as such. Yet in all this time there has never been a year when there has been half as many cases reported as there have been deaths from this disease. In many instances the family specially request that such reports shall not be made, and in some instances the doctors fear that they may lose their patient if such a report is made, the case going to some other practitioner. In some instances they neglect to report and excuse themselves by saying that they were not sure it was tuberculosis until near the end. Undoubtedly many cases of death are reported as being from marasmus, bronchitis or bronchopneumonia, or chronic diarrhea. In fact, the doctor on

being questioned will admit when such causes are given as resulting in death that possibly it may have been tuberculosis. To correct this we must have different and positive statements in the teachings of our medical colleges, and very much more education for the laity in the importance of a correct diagnosis at the earliest possible moment, as well as a most thorough co-operation in faithfully carrying out the treatment advised.

To secure not only the recovery of the patient, but at the same time to prevent the infection of others, the patient must give his most earnest, continued, and persistent coöperation, and the family must be made to understand that they are not to become weary in well doing, but that they are to be faithful and persistent allies of the physician in prosecuting thoroughly and with great care his every injunction as to the management of the case. The importance of thorough disinfection of the house, and especially of the rooms occupied by the deceased, should be especially emphasized.

It is at this stage of the case that local organizations of women's clubs or sunshine societies, or by whatever names aids may exist, if their members are properly educated and possessed with the missionary spirit of doing good, can come to the aid of the doctor, not with meddling suggestions, but with wisdom born of knowledge, and they may prove to be angels of loving helpfulness to the medical attendant.

The value of sanatoriums for incipient cases cannot be questioned, but the sooner the public recognizes that the advanced cases are the true causes of and real danger to society, and demands of the State that proper hospitals be provided for the care of all such, in order to protect the community from the menace which they are, as well as for humanity's sake to comfort and smooth the last weeks of a life that is gradually fading into the unseen, the sooner shall we reach the goal of our ambition of stamping out tuberculosis.

SOME ECONOMIC ASPECTS OF THE FREE TREATMENT OF TUBERCULOSIS BY THE STATE.

By Rowland G. Hazard,
Peacedale, Rhode Island.

At the opening of the Rhode Island State Sanatorium at Wallum Lake the percentage of free cases was comparatively small (about 20 per cent.). The act creating the establishment authorized the free treatment of those who could not otherwise avail themselves of the advantages of the State Sanatorium. The act further provided that the trustees should fix upon the weekly charge per patient. After comparison made with sanatoriums in other States, the weekly charge was made five dollars per patient, whether male or female. It was known at the time of the fixing of this charge that the State would contribute at least as much more to the support of patients, since it was found that the weekly cost per patient was approximately ten dollars. As time passed the number of patients upon the free list increased regularly, until in the month of March, 1908, or a little over three years after the opening of the sanatorium, the number of pay patients was reduced to about 20 per cent.

The same method of ascertaining the ability of patients to pay—a necessity laid upon the trustees by the conditions of the act—has been in vogue from the beginning. Cases applying for free treatment have been referred without exception to the Providence Society for Organizing Charity, and each case has been looked up with great care, and the full circumstances have been classified on blanks prepared for the purpose, a record of which is kept in the office of the trustees of the sanatorium. Practically it is upon the report of this Society for Organizing Charity that the decision is made as to whether a patient can or cannot afford to pay one-half of the cost, or five dollars, according to the scale of prices set by the trustees.

It has been increasingly evident that free patients can often take care of themselves after discharge when they could not take care of themselves before admission. From this it may be inferred that the care bestowed upon the free patient by the State, together with the cure effected in whole or in part, has reëstablished the credit of the free patient, so that, while incapable of borrowing when he entered the institution in an apparently

moribund condition, he is able, upon leaving the sanatorium, to borrow money from his friends, sometimes in considerable amount. This may be regarded as a natural result of the improvement in his health, which any one can see. No one would think of loaning money as an investment to a person about to die, while some might be willing to lend to a person recovered from an illness, in whose good faith they had confidence.

On the other hand, a question occurs as to whether the average free patient is not disingenuous upon admission. Is it possible that what might be regarded as a burial fund is always or generally reserved by the free patient in order to take care of the possible contingency of his death? If such were the case, the improved condition of health upon discharge might make the recovered or improved patient willing to expend the money reserved as a death fund.

As throwing some light upon the question, we find the case of those patients who have not been improved under free treatment, who, nevertheless are able to continue their own course of treatment at their own expense by removing themselves to a distant climate at the cost of an expensive journey. It is not fair to suppose that these patients have improved their credit, because their physical condition has not materially improved; they may be heavier and they may look better, but it is well known that many cases will not show radical improvement, even after faithfully following the course at an open-air treatment hospital, such as the Rhode Island Sanatorium. This is particularly true of those who arrive too late, in the secondary or even final stages of the disease.

While, therefore, it is possible to build up an ingenious theory that the work of the State in providing free treatment is creative of credit for each improved patient, it appears to be also tolerably certain that no method of inquiry into the ability of patients to pay any part of the cost of their cure will suffice to give the real facts.

In cases where improvement is manifest, and the free patient goes out with the ability to borrow more than equaled by his ability to earn, and to pay off the sum borrowed, is it feasible for the State to expect the return of any part of the money expended for free treatment?

The question is raised as a purely economic one, and not with the expectation that it will be found feasible to put into practice. It would probably be a very unpopular plan, and might interfere seriously with securing patients enough to fill the hospitals. Nevertheless, there would appear to be a chance for the cultivation of one of the higher virtues, that is to say, gratitude, which is at present neglected, by the failure to take from those who apply for free treatment an agreement to repay the State at their leisure such sum as may be expended upon each—such sums as would have been demanded if they had been paying patients in place of free.

Einige ökonomische Ansichten der freien Behandlung der Tuberkulose durch den Staat.—(HAZARD.)

Die Beobachtungen und Schlüsse, welche folgen, gründen sich auf die Zustände in dem Rhode Island Sanatorium in Wallum Lake, Rhode Island, in der nordwestlichen Ecke des Staates, in einer Höhe von 650 Fuss gelegen.

Es ist immer mehr und mehr augenscheinlich, dass Freipatienten für sich selbst nach der Entlassung Sorge tragen können, selbst wenn sie vor der Zulassung es nicht tun konnten. Aus diesem kann man annehmen, dass die Pflege, die der Staat den Freipatienten angedeihen liess, zusammen mit der Heilung, die entweder ganz oder teilweise vor sich gegangen ist, den Credit des Freipatienten wieder hergestellt hat, sodass, während es ihm unmöglich war, Geld zu borgen, als er in einem scheinbaren Sterbezustande in die Anstalt eintrat, er nun nach dem Verlassen der Heilstätte befähigt ist, Geld von seinen Freunden, und sogar manchmal in beträchtlichen Beträgen zu borgen. Dies mag als ein natürliches Ergebnis der Besserung in seiner Gesundheit, welche jedermann sehen kann, betrachtet werden. Niemand würde daran denken, einer sterbenden Person Geld als Anlage zu leihen, während einige willig sein könnten, einer Person, die von einer Krankheit gesundet ist, und zu der sie Vertrauen haben, Geld zu leihen. Andererseits kann die Frage aufkommen, ob der durchschnittliche Freipatient nicht unredlich bei seiner Zulassung ist. Ist es möglich, dass was vielleicht als ein Begräbnisfond betrachtet werden könnte, immer oder gewöhnlich von dem Freipatienten reserviert wird, um für einen eventuellen Todesfall Sorge zu tragen? Wenn solches der Fall wäre, würde der gebesserte Gesundheitszustand nach der Entlassung den Erholten oder Gebesserten willig finden, das Geld, welches als ein Todesfond reserviert war, zu spenden. Um einiges Licht auf die Frage zu werfen, finden wir die Fälle von Kranken, die unter der Freibehandlung sich nicht besserten, die aber nichtsdestoweniger ihren eignen Kurs der Behandlung auf ihre eigne Kosten fortsetzen können, indem sie in ein fernes Klima gehen, trotz der Kosten einer kostspieligen Reise. Man darf nicht mit Recht annehmen, dass diese Patienten ihren Credit verbesserten, weil ihr körperlicher Zustand sich nicht wesentlich gebessert hat.

Sie können schwerer sein, und mögen besser aussehen, aber es ist wohlbekannt, dass viele Fälle keine gründliche Besserung zeigen werden, selbst auch nach einem gewissenhaft absolvierten Kurse in einer Freiluft-Heilstätte, wie zum Beispiel das Rhode Island Sanatorium ist. Dies ist besonders der Fall in denjenigen, die zu spät kommen, in dem secundären oder im letzten Stadium der Krankheit.

Während es daher möglich ist, eine geistreiche Theorie aufzustellen, dass die Arbeit des Staates in der Lieferung von Freibehandlung kredit-

schöpferisch für solche gebesserte Patienten ist, erscheint es auch ziemlich sicher, dass keine Methode der Auskunft über die Fähigkeit des Patienten einen Teil der Kosten ihrer Heilung genügen wird, um die wirklichen Tatsachen zu geben.

In Fällen, wo die Besserung offenbar ist, und der Freipatient weggeht mit der Fähigkeit, mehr Geld zu borgen, als seine Fähigkeit zu verdienen ist, und die geliehene Summe abzuzahlen, ist es denkbar für den Staat die Rückzahlung eines Teiles der Auslagen für die Freibehandlung zu erwarten?

Die Frage wird nur als eine rein ökonomische aufgestellt, und nicht mit der Erwartung, dass sie in der Praxis als wirklich durchführbar gefunden werden kann. Es würde wahrscheinlich ein sehr unpopulärer Plan sein, und könnte ernstlich verhindern, genug Patienten zur Füllung der Hospitäler zu erlangen. Dennoch könnte es erscheinen, dass es eine Gelegenheit für die Kultivierung einer der höheren Tugenden, nämlich der Dankbarkeit, die in der jetzigen Zeit vernachlässigt wird, wenn man von denjenigen, die sich für freie Behandlung melden, keinen Vertrag annimmt, dass sie dem Staate solche Summen, die man auf sie verwendet hat, nach ihrem Belieben zurückzahlen—einen solchen Betrag, der von ihnen verlangt worden wäre, wenn sie anstatt Freipatienten Zahlpatienten gewesen wären.

SOME OF THE NEWER PHASES OF CONSTRUCTION AND MANAGEMENT OF STATE SANATORIUMS AS EXEMPLIFIED BY THE OHIO INSTITUTION.

By Charles O. Probst, M.D.,
Columbus, Ohio.

The construction and management of a State sanatorium for tuberculosis should be determined by the main object of such an institution. Is it to be chiefly curative, custodial, or educational purposes? Take a State like Ohio, with its four and one-half millions of people, and some twenty thousand victims of pulmonary tuberculosis constantly on hand. Consider further that many of its medical men, and only a few of its most intelligent laymen, are just beginning to realize that tuberculosis is curable and preventable, but have not yet accepted, except in a half-hearted way, the conviction that it can be cured at home, and therefore continue to look to other climates for some wonderful healing properties that our own does not possess. With these conditions, if but one institution is provided for, the largest returns will come for the present by treating it as an educational institution—educational for medical men as well as laymen.

Accepting this as its main object, the sanatorium must be planned and managed so as to secure the greatest possible percentage of cures—temporary (arrested cases) and permanent.

Construction.—It goes without saying that the most exacting requirements of sanitation are to be complied with as far as possible in the site selected and in the buildings erected. Soil, water, view, shelter, forest, purity of atmosphere, must all be as nearly ideal for healthful living as possible. The site should also afford possibilities for the healthful occupation of patients. This is one of the newer phases of sanatorium management, and will be referred to later.

In the construction of the buildings, aside from the usual sanitary requirements, the question of pure air and nourishment—probably the two most important factors in phthisiotherapy—should be given special consideration.

Accepting as proved that the purity of the air in inclosed spaces, no matter how ventilated, can never equal that of the air outside, the permanent

arrangements for sleeping can be none other than out-of-doors for practically all cases.

Many think no harm results from taking a patient from her home and plunging her at once into outdoor zero temperatures. Few patients will say that this is a comfortable experience. It may be avoided by having reception cottages for new arrivals, constructed to permit of either indoor or outdoor sleeping. Another advantage of this plan will be referred to in the management of cases.

Milk and eggs, forming such an essential part of the diet of sanatorium patients, should be of the best. Those who appreciate the delicacy of a really fresh-laid egg can understand the advantage of producing your own hen-fruit for patients who must often be given eggs daily for months at a time. There are also many advantages in producing your own milk, as regards taste and purity. Vegetables fresh from your own garden are not only a luxury, but will be partaken of more plentifully. A modern sanatorium, aiming for the highest possible results, should therefore produce its milk, eggs, and vegetables.

The Ohio State Sanatorium has been planned to meet all these requirements. The site of 357 acres of dry, fertile land affords an excellent building location, well sheltered from winter winds. There are 125 acres of woodland, mostly original forest, and three large springs of cool, pure water, sufficient for all purposes. Conditions are favorable for gardening, farming, and horticulture.

The buildings consist of an administration block, which embraces necessary offices, treatment rooms, and officers' living rooms, dining-room, amusement hall, kitchen, and cold storage. The dining-room was given special treatment to make it the pleasantest room possible, with the object to encourage eating. The floor is 87 by 37, with a 29-foot fine raftered ceiling. The sides and front are largely glass. There are special appliances for opening at any angle the four tiers of windows, giving free ventilation. It projects well to the south, affording to every dining table a fine view to the south, east, or west. Special care was taken to protect the dining-room from kitchen odors.

Besides the administration block, now completed, there will be the power plant and laundry, two reception cottages, six sleeping shacks, infirmary, superintendent's residence and employees' cottage, with necessary farm buildings. There may be some criticism for building such an expensive institution. The administration block and power plant will alone cost a quarter of a million of dollars; the other parts are of comparatively cheap construction. The former are the essential elements of any State institution; and it is at least possible that the State may hereafter decide to abandon the sanatorium idea, finding other more effective and more economical

methods for combating tuberculosis. In that case there will be little loss in converting the sanatorium into some other more needed State institution.

MANAGEMENT OF CASES.—The act governing the administration of patients had in view some newer phases of the management of cases, as well as the central object of the sanatorium, *i. e.*, to serve as an educational institution. In the first place, the number of patients has been limited by the size of the dining-room and other features of construction. The total capacity is 200. This will permit of greater individualism in the treatment of cases and make less liable routine methods—the bane of public institutions.

Only early, favorable cases will be received. Furthermore, as cases apparently favorable may soon prove to be unsuitable for sanatorium treatment, all patients are to be received on four weeks' probation. They will not be regularly admitted, nor figure in the records of cases, until after a four weeks' trial. This should insure a select class of patients and a high percentage of favorable results. There may be the danger in this of arousing a doubt in the minds of those who do not understand incipient tuberculosis as to whether those reported cured really had the disease. With the improved methods of diagnosing early tuberculosis now available, this danger should be easily avoided.

The reception cottage plan is new, though not original. There is a first and second story of single rooms facing south, or nearly so, with a corridor behind and a sleeping veranda in front. A wide door permits the bed to be rolled to the veranda. The rooms may be moderately heated, and have, by doors and windows, the freest possible cross-ventilation. All probation patients come to the reception cottages, and may sleep indoors or outdoors. There is thus an opportunity for acclimatization in very cold weather. The reception cottages, male and female, are next to the administration block, so that new patients may be under close medical supervision.

After the four weeks' observation period, or sooner, if desirable, patients will be transferred to the sleeping shacks, where all must sleep outdoors. These are for twenty patients. They are one story, with two sleeping porches separated by an assembly room, back of which are the dressing-room, lavatory, and attendant's room. Each shack will have an attendant, who will sleep there at night.

In the lavatory is a small dressing-room for each patient, with a wardrobe, open to the air, for hanging clothing. There are in each shack 4 shower-baths, a water-closet, 8 lavatory bowls, a jet drinking-water fountain, thus avoiding a common cup, and a special bowl for cleansing the mouth and teeth. The lavatory and dressing-rooms will be comfortably heated, but well ventilated. A patient on arising in the morning has but a few steps to take to find himself in a comfortably warm place. He can take a shower-bath, and

in his dressing-room, in perfect privacy, put on his day garments. At night the order will be reversed. He will undress in a warm room, hang his day clothing in a well-aired wardrobe, and step into his bed. Electrical bed-warmers are available for those who may need them.

An infirmary, or hospital, is treated, in a general way, like the reception cottages; that is, with single rooms and a veranda, so as to permit of either indoor or outdoor sleeping. It has its own dining-room and diet kitchen and an operating room. It is located in a sheltered place, out of the road of travel, so that those actually ill may not be seen by the others.

It is the experience of many State sanatoriums that the best class of patients, those that have the brightest prospect of cure, are not easily secured, and are hard to retain a sufficient length of time for lasting results. It has been found, furthermore, that there is a large percentage of relapses among sanatorium patients who, after too short a stay, return to unsanitary and unhygienic surroundings, and often, in addition, to unhealthful occupations. There is danger, also, with a certain class of sanatorium patients who gain a living by muscular labor, that with a six months' stay with nothing to do they will either become work-shy and shiftless, or, on the other hand, of such reduced musculature that they easily break down on attempting to take up actively their former occupation.

These problems are pressing upon all those engaged in sanatorium work. To help solve them the following provisions have been made for the management of the Ohio sanatorium.

In the first place, a charge of $5 per week is made for each patient. This will exclude an undesirable class, from an economical standpoint, who should be cared for in other institutions.

It may be stated, parenthetically, that Ohio has recently provided for a hospital for tuberculosis in each county, of which there are eighty-eight, for the care of patients who are not suitable cases for the sanatorium. These are free, but $3 a week, or any less sum the directors may determine in individual cases, may be demanded from those able to pay the charge in whole or in part.

To provide for the admission to the State sanatorium of suitable worthy cases who are unable to pay the weekly charge, the managers may accept any sum less than five dollars per week that they may see fit for 10 per cent. of the total number admitted.

To induce patients to remain long enough to secure the best results of treatment; to harden them so that they may return to former occupations with the least detriment; and, further, to teach patients occupations to enable them to gain a livelihood out-of-doors, the trustees of the sanatorium are authorized to provide suitable outdoor employment, and to pay patients not to exceed $5 per week for their labor. The medical superintendent will

have full control, and will determine the quantity and quality of work each patient may do.

This arrangement will permit of at least 10 per cent. of the patients gaining entrance to the sanatorium free of charge, and of earning something like $5 per week during most of their stay. This, it is hoped, will help solve the vexed problem of supporting the family during a good part of the time the breadwinner is "making his cure," and thereby induce him to stay longer. It may also help solve that other problem of teaching patients how to make a living at some new, healthful occupation, and prevent many from returning to those conditions which so often cause their disease to be lighted up again.

To summarize:

Ohio is providing a small institution, the main object of which is educational.

This is located upon large, healthful, and fertile grounds.

Only favorable cases will be received, and these upon four weeks' trial.

Reception cottages receive new patients, and these are arranged to insure their close medical supervision, and to permit of either indoor or outdoor sleeping.

Special provision will be made for the employment of patients, for which they will be paid.

Cases unsuited for sanatorium treatment are to be cared for in county hospitals.

Algunas Nuevas Fazes en la Construcción y Manejo de los Sanatorios, Demostradas por el Instituto de Ohio.—(PROBST.)

El Sanatorio del Estado de Ohio ha sido construido como una institución de educación. Es para enseñar al médico de la familia, y por medio de él á los profanos, que la tuberculosis puede curarse en casa, y cuál es el mejor medio para ello. Un alto percentage de curas permanentes llenan el objeto mejor. A este fin, solo se reciben casos favorables, elejidos, y estarán bajo prueba por un petíodo de cuatro semanas.

Vida exterior, día y noche, es requerida: solo dos casas de campo con cuartos y colgadizas para dormir, reciben los pacientes á prueba y permiten un cambio gradual á una completa existencia en el exterior.

Para acostumbrar al paciente á la vida después del sanatorio y ayudar una cura permanents é inducirlos á permanencer tiempo bastante para obtener resultados, se los provee de empleo á propósito por el cual debe pagársele cinco dollars por semana.

La alimentación no secundaria respecto ningun otro factor de cura. Para alentar la alimentación el comedor, en localización (exterior), construc-

ción (luz, ventilación), proporciones y muebles, se ha hecho la chef d'oeuvre. El huerto, (357 acres) suplirá leche, huevos, aves y vegetales, frescos y por tanto agradables.

El médico superintendente tendrá la inspección suprema de la institución, los pacientes y otros oficiales y empleados.

Quelques unes des plus récentes innovations dans la construction et l'administration des Sanatoria illustrés par une institution de ce genre dans l'Ohio.—(PROBST.)

On construit le Sanatorium de l'Etat d'Ohio pour servir d'institution d'éducation. C'est pour enseigner au médecin de famille et, par lui, au public, que la tuberculose peut être guérie à la maison et les meilleurs moyens de le faire. Le meilleur moyen d'atteindre cet objet est de montrer une proportion élevée de cures permanentes. Dans ce but on ne recevra dans le Sanatorium que des cas choisis, favorables et ces cas seront recus quatre semaines à l'essai.

Les malades devront vivre en plein air jour et nuit; mais on a bâti deux villas de reception avec des chambres et des vérandas pour dormir, pour recevoir les malades qui sont admis à l'essai et leur permettre de changer graduellement et de s'habituer á l'existence en plein air.

Pour préparer les malades à la vie qu'ils devront mener après avoir quitté le Sanatorium, pour assurer une cure permanente et pour les encourager à rester assez longtemps pour obtenir des résultats, on a pourvu des occupations en plein air convenables, pour lesquelles on peut leur payer cinq dollars par semaine.

La nourriture est un facteur d'une importance suprême. Pour encourager l'appétit des malades, on a fait un véritable chef d'œuvre de la salle á manger par sa location (vue), sa construction (lumiére, ventilation), ses proportions et son ameublement. La ferme (357 arpents) doit fournir le lait, les œufs, la volaille et les légumes, le tout frais et par conséquent appétissant.

Le directeur médical aura le contrôle suprême de l'institution, des malades et autres fonctionnaires et employés.

Einige der neueren Erscheinungen in der Construction und Leitung von Sanatorien, wie sie sich bei der Institution in Ohio zeigen.—(PROBST.)

Das Ohio Staats-Sanatorium wird als eine Erziehungsanstalt gebaut. Es soll den Hausarzt und durch ihn die Laienwelt lehren, dass Tuberkulose zu Hause geheilt werden kann, und wie dies am besten durchzuführen ist.

Ein hoher Prozentsatz von vollständigen Heilungen wird diesen Zweck am besten erreichen. Um dies zu erreichen, werden nur ausgewählte, günstige Fälle aufgenommen, und sie werden einer vierwöchentlichen Probezeit unterliegen.

Es ist dafür gesorgt, dass sie Tag und Nacht im Freien sind, aber zwei Aufnahmehütten mit Zimmern und Schlafveranden werden Patienten auf Probezeit aufnehmen und eine stufenweise Veränderung für das Leben im Freien vorbereiten.

Um Patienten für das Leben nach dem Sanatorium geeignet zu machen, um eine dauernde Heilung zu fördern und sie zu veranlassen, lange genug zur Erreichung der Resultate zu verbleiben, wird eine passende Einrichtung für das Leben im Freien vorgesehen werden, wofür fünf Dollars per Woche gezahlt werden dürften. Die Ernährung ist nicht weniger wichtig als irgend ein anderer Factor in der Heilung. Um das Essen anzuregen, ist das Speisezimmer in Bezug auf Lage (Ausblick), Construction (Licht, Ventilation), Grössenverhältnissen und Möblirung zum "chef d'œuvre" gemacht worden. Der Grundbesitz (357 Acker) dient der Versorgung mit Milch, Eiern, Gemüsen, und Geflügel, die frisch und daher wohlschmeckend sind.

Der ärztliche Leiter wird entscheidendes Verfügungsrecht über die Anstalt, Patienten, anderen Beamten und Angestellten haben.

THE FUNCTION OF MUNICIPAL GOVERNMENTS IN LICENSING PRIVATE SANATORIUMS FOR TUBERCULOSIS.

By Herbert C. Clapp, M.D.,
Boston. Consulting Physician to the Massachusetts State Sanatorium at Rutland.

The sanatorium for the treatment of tuberculosis has now thoroughly proved its raison d'être, and has evidently come to stay. Within the last few years the number of them, both public (or semi-public) and private, has very greatly increased all over the civilized world, especially in Germany, the land of their birth. In our own country the national government is conducting sanatoriums for soldiers and sailors, and one State after another has fallen into line in establishing them at the public expense, or in taking the preliminary steps. Nobody doubts that in the near future every State in our union will have at least one. They are not perfect; they do not cure every patient; but still they do a splendid work, and if physicians and the people could only be aroused to the importance of sending cases early enough, the results would be truly wonderful, especially in comparison with the results of treatment by other means only a few years ago.

No matter how rapid the increase, however, sanatoriums never will accommodate more than a fraction of the consumptive population, for various reasons, and the majority of these patients must be treated on sanatorium principles at home. And yet those for whom the sanatorium is a necessity should not be deprived of its privileges. There now seems to be a good prospect that before very long there will be a fair number of State or private sanatoriums for those of the poor or in very moderate circumstances who can and will go to them; but in this country, or in most parts of it, at any rate, certainly in comparison with many places abroad, there seems to be a great lack of private sanatorium accommodation for people in good circumstances, who can afford and desire to pay in full for what they get. For this lack, it would seem, there are many causes, some of which will be mentioned later. The inhibiting cause, which particularly concerns us just now, is the present common method of licensing private sanatoriums, which adds to the many other obstacles (arising from natural causes) to the organization of such sanatoriums, one which is often insuperable and practically prohibitive.

Now the common custom is, where there is any law on such matters at all, for the city or town (the municipality), either openly to license or negatively and tacitly to allow to exist, the place where the patients live, whether the number of these patients is one, two, twenty, or thirty. This method, in my opinion, ought to be changed, and the licensing power given to the State, unless some better way of accomplishing the same results can be suggested, in which case it will cheerfully be substituted in this place.

Those who have not thought much about the subject may find it hard to realize that the obstacles arising from natural causes, above referred to, can be at all serious. These people perhaps call to mind the very numerous private institutions for nervous and some other diseases, and for alcohol and drug addictions, thickly scattered through our country, which seem to be prosperous, because well supported by people of means. Why should not similar places for the tuberculous prosper financially? Here are some of the reasons:

The natural demands of those who expect to pay a good price are many and exacting, and require the expenditure of considerable money. Some of the requirements of a first-class private sanatorium for those in good circumstances may be summed up as follows:

1. At the head must be a good man for the purpose. He should be a tuberculosis expert, a man of education, experience, and reputation, who can command the confidence of his fellow-physicians and of the community. He should not try to make up his lack in these qualifications by any amount of assurance.

2. A good location is important. Although we now know that people can get well almost anywhere, even in a big city, if they are made to live rightly, yet there are certain things that are desirable, if a person can get them and is able to pay for them.

A sanatorium for such should by good rights be out of a city far enough to secure ample grounds, as well as to make it a little difficult for all of the patient's friends to visit him too often, and also far enough off to have the proper seclusion, so that the patient, when "sitting out," does not have the awkward feeling of being on exhibition. And yet it should not be so far out as to make the necessary travel burdensome to the patient and his friends, and to those connected with the place. In other words, it should be easily accessible and not at too great a distance from a railroad station.

If possible, it should be on a hillside, sloping to the south, to get the maximum of sunshine and to be protected from the most trying winds. Altitude is not essential, but as some people think it is, it may be demanded. People have been known also to get well without beautiful scenery, but nevertheless a fine view is an inspiration, and in my opinion a not unimportant therapeutic adjunct.

3. Such a place as has been partly described is very apt to be so situated that no town water system is available; in which case a private and independent water system has to be installed, as well as a modern system for the disposal of sewage, both of which are expensive.

4. For the treatment of nervous or many other diseases a building erected for ordinary purposes can often be made to answer; but for a tuberculosis sanatorium, even of small size, certain modifications are desirable, especially in warm weather or in warm climates. It is not now considered necessary to go into the extravagances of construction which were at first advocated, and for large public sanatoriums for the poor, cheap modifications of the Loomis lean-to shacks can be used. Much more elaborate construction of these, however, would be necessary for people who pay a good price, and some of these people would be satisfied with nothing less than luxurious buildings patterned after the unique "Cragmore" style, having specially constructed private rooms with individual sleeping porches attached, as designed by the late Dr. Solly, or the beautifully planned Reception Hospital at Saranac Lake, with its ingenious facilities for pushing each bed from its bedroom out on its individual porch in suitable weather. Of course, additional buildings for other than sleeping purposes will have to be provided.

5. Notoriously many people are fastidious about their food, but this problem, although real, is one that is always to be expected by people who feed outsiders.

6. Proper amusements and occupations have to be provided for the patients, which involves no little care-taking and extra thought.

7. Until lately, for so many years it has been customary and fashionable to send patients from most other parts of our country to Colorado, southern California, or other health resorts, that in many people the idea has become inherent that those are the only places where the disease can be cured. This positive opinion has been considerably shaken by the unmistakable facts as to the recovery in large numbers of consumptives near their own homes. But still the old idea was so firmly rooted that some hesitate about trying the experiment here, if they can possibly get away, or about continuing here after the first setback, which might have happened in any other part of the world. This feature presents an element of uncertainty to one who is trying to forecast the future as to the likelihood of keeping his institution full.

8. A sanatorium physician is naturally dependent, to a large extent, in keeping his place filled, on the recommendations of his fellow-physicians to their patients and friends. In some cases these physicians are glad to recommend; but in others they see no reason why they themselves cannot properly treat such patients in the patients' own homes by sanatorium methods. They may be competent to do so, or they may not, but in either

case they are willing to reap the pecuniary rewards for so doing. Some patients can be thus treated very successfully by a physician who understands the work thoroughly, and some cannot be so treated. Again, some physicians who have heard only enthusiastic tales of remarkable recoveries fail to recognize the limitations of the new treatment, and quickly become discouraged if their patients do not uniformly make good progress, and then at once urge them to make a change. These are some of the discouragements to be expected from the profession.

9. If a carefully managed private charitable sanatorium finds its expenses overrunning its receipts, all that is necessary to do is to make an appeal to the public for financial aid. This cannot be done with the kind of sanatorium now under consideration. It is supposed to be a business enterprise. Neither can its originator expect to get it endowed for the same reason. And if he were lucky enough to secure a substantial endowment, would the well-to-do patient be willing to take advantage of such assistance, which would really make the institution to that extent a charitable one?

10. Another thing that might make such an investment more or less risky is the fact that so many fads are prevalent. People are fickle. To-day one method of treatment appeals to them, to-morrow another. Whether the method has any merit or not, it does not matter. If the people are persuaded that it does, that fact is sufficient to influence in favor of or against any sanatorium. Then, again, many consumptives are, or become, chronic rovers, as every one knows. They go to one place, convinced that it will cure them. In a short time they are discouraged and think they have made a mistake, and go to another, and so on.

All these ten "obstacles," and others which might be mentioned, show that it is expensive to organize and run a private pay-sanatorium, and that the enterprise involves not a little risk. It takes much money even to rival what can be got at a good State institution, where patients can go for little or nothing. Massachusetts, for instance, has economically spent considerably over half a million dollars already on its sanatorium equipment, to which it is constantly adding.

The License.

It is not claimed that these obstacles are insuperable, however. So far as they go, a manager with executive ability might calculate and plan in advance, as well perhaps as for some other novel enterprises, making due allowance for his risk, and charging a price big enough to cover all probable shortages, provided that price does not seem prohibitive.

Even then, if on this basis a careful figuring of profit and loss should show the enterprise to be fairly sound, another problem has to be dealt with, which may nullify the whole project, and that is the license. If the authorities

of the municipality (as they may and often do) absolutely refuse to grant it, nothing more can be done. If they refuse as to the desirable plan selected, but are willing to grant a license for a location which is inappropriate, it about amounts to the same thing. If they are favorably impressed and grant the license for the desired location, and the land is bought and improved, the buildings constructed, and everything put in order at great expense, and patients received for a while, and then as a result of some popular agitation the authorities have local pressure enough brought to bear on them to make it expedient for them to change their views, they have the power to revoke the license and put the sanatorium out of business. What can the owners of it then do? They have an elephant on their hands. If the buildings have been constructed on modern tuberculosis sanatorium principles, it would be exceedingly hard, if not impossible, to find any other practical use for them, and they might easily become a dead loss, unless they were almost entirely remodeled at great expense. Even then the fact that they had been used for tuberculosis would "hoodoo" them. Nothing can be done but to sell the whole property at a ruinous sacrifice. Who can afford to run such risks as these, while trying to conduct a sanatorium on business principles, not with the object of making a fortune, but simply of earning a modest livelihood? If the sanatorium in such a case were not a business, but a charitable enterprise, it would be sad waste of money contributed by many good people; but a private organizer, unless he had a large capital back of him, could easily be swamped.

Why should the city or town authorities refuse to license an enterprise which promises to bring money into the town, or why should they revoke a license once granted? The principal reason, expressed in one word, is phthisiophobia.

A great many people are willing that consumptives should be treated, but not near them; for, like the lepers, they are unclean. They do not know or realize that a careful consumptive is no menace to the public health. In their fright and selfishness they urgently appeal to the town authorities to refuse the license, and to this end bring to bear on them influences of relationship, friendship, business, politics, religion, or what not. It is a hard place for the town officers to put in, supposing they are honest, conscientious, kindly, and well posted on the subject. Nor are they always so well endowed: sometimes they have a good deal of human nature in them, and sometimes they are phthisiophobée themselves. No wonder, then, that, as a matter of fact, licenses are often refused. Every one knows that the great majority of hotels discriminate against consumptives at summer or winter health resorts, and that strong efforts have been made in California and Colorado and other places to keep the unfortunates out of the States.

As a single instance of how such questions are often decided, not on their

own merits, but by politics and influence alone, a few years ago the Cullis Free Home for Consumptives at Grove Hall, occupying several acres of land, one of the oldest and best of our worthy private charities in Boston, where many hundreds of advanced consumptives have been cared for and have died in comparative comfort, and through which the city has been saved much money, was brought before the Board of Aldermen on a charge of being a menace to the health of the community. The principal witnesses against it were large real-estate men, who had interests in the immediate vicinity which they wanted to develop by cutting through streets and selling lots at high prices, as it was a rapidly growing section of the city, and the presence of a consumptives' home depreciated the desirability of such lots. After several largely attended and exciting hearings it was decided by a strictly political party vote, 7 Democrats to 6 Republicans, that the home be allowed to stay, and need not move to distant parts. A very narrow escape. In addition to the benefits to the recipients of its charity, this home, by segregating so many in the last stages of the disease, must have done a great deal to prevent its spread among others.

Only this year the Massachusetts Tuberculosis Commissioners, to whom is intrusted the task of building three new State hospitals for consumptives, decided to build one of them in the little town of Georgetown. When this became known, the town was up in arms as one man, and a storm of protest was aroused and expressed at public meetings. No private sanatorium could have stood against such opposition. As everybody knows, New York has encountered great difficulties in the establishment of sanatoriums by the opposition of individuals and communities. And yet it has been demonstrated repeatedly that, in the regions immediately surrounding good sanatoriums, there is actually less, rather than more, of the disease, on account of the good influence of their example.

Now, as to the remedy. In this case, as in some others, it is easier to recognize the trouble than to cure it. Any new scheme must probably be to a large extent tentative. First, we must all recognize the desirability of having numerous private sanatoriums in our midst for people of means. Such people should not be compelled to be ostracized any more than the poor, if they choose to get well near home. Many now are improving either in their own homes or in the homes of others better situated for the purpose; but some want and need also the detailed care of a sanatorium. Besides, such care is a part of the big campaign against tuberculosis which is now beginning to be waged, and to absorb so much of the public attention in the laudable endeavor to stamp out this dread disease.

Granting this, it follows that such legislation is desirable as shall encourage, or at any rate not obstruct, the organization of such sanatoriums. The State should grant the license instead of the municipality. A State

officer, ex officio, has a wider range of vision and an ability to decide such questions with greater fairness and justice to all. He is naturally free from local prejudice, and less liable to be influenced by personal considerations than a town officer in his own town. The latter is "John," and the man who lives next to the place which is desired for a sanatorium, and who is violently opposed to it for fear of catching the disease, is his old chum "Bill," who married his sister. "Now, John, you wouldn't let your own sister be exposed to danger, would you?" And John is won, perhaps against his better judgment, on account of personal considerations.

A man in a country town who as a sheriff has to arrest his old boyhood friend for crime, and does his duty, must be almost as much of a Spartan as a judge on the bench sentencing his own boy. Human nature is weak, and we ought not to put it to too great a test. If a man is accused of a heinous crime, and the populace is excited almost to the point of mobbing him, he sometimes can be tried in another county, where the public feeling may be calmer and fairer.

If the State has the licensing power, by whom shall it be exercised? Looking for an analogy, if a physician in Massachusetts desires to open a private hospital for the care of insane and nervous patients, he makes written application to the governor for a license, and the governor grants it, after having consulted the State Board of Insanity. For the past four years this board has refused to recommend the granting of this license unless the physician who applies has had a hospital experience.

The licensing of a tuberculosis sanatorium might be granted by the governor after consultation with the State Tuberculosis Commissioners or the board of trustees in charge of the State sanatorium. Or, from another point of view, the State Board of Health might form the advisory council. If the licensing power should still continue to be vested in the local board of health, it would seem to be exceedingly important, in case of their refusal to license, to allow the applicant the privilege of appeal to the State Board of Health; and in fairness the same privilege might be granted to the opposition to the license, in case it should be granted by the local board. At any rate, it ought not be made too difficult for educated and honorable physicians to get licenses, on presentation of the proper credentials. The licensing power should be particularly careful not to yield to the protestations of opposing neighbors, if the general good of the community seems likely to be promoted. In cases of conflict the State ought to override the municipality, as Massachusetts did recently, in another line, in the case of Fall River. The latter city, although large, had no contagious hospital, and seemed disinclined to build one, until the persuasions of the State were effectual; and now, as a result, very handsome plans are shown.

The question may arise. What constitutes a sanatorium? How few

patients could a place of this kind have, and yet be entitled to the name? Could it be a sanatorium, and yet have only one patient? or two? As it is now, in States or cities when by law a physician must "notify" the board of health when he finds a patient has tuberculosis, just as he would if it were scarlet fever, the board of health, on his report, virtually licenses his treatment of the case. If he had two or three patients (perhaps relatives) with the same disease in the same house, would this constitute a sanatorium and require a different license? It seems hardly necessary to take such a question seriously. Nor is it necessary to record minutely all the close and nice distinctions which might theoretically be made. It can safely be left to the common sense of the community. When (if ever) embarrassing situations arise, then it will be time enough to define and to further register accordingly.

On account of the many difficulties to be overcome, there will probably never be a large number of private pay-sanatoriums for the well-to-do, no matter how easy the road is made by the authorities. It does not appeal to the money-makers, and a manager may consider himself fortunate if he makes both ends meet.

But there probably will be a great field open for private charitable sanatoriums. There is a limit to the public ones, and none of them ought to be too large and unwieldy. Many people are clannish, and desire to flock together by themselves. The Jews especially are likely to want their own. The Baptists, Methodists, Episcopalians, Presbyterians, or the Masons and Odd Fellows may have a gregarious feeling come over them. If so, they ought to be encouraged. It is one more battle in the big campaign against tuberculosis, and each effort of this kind helps to educate a different part of the body politic. After all, education of the public is the only effective means against this miserable phthisiophobia, which in one way or another often works almost as much hardship as ignorance of the communicability of the disease. In such a matter as we are now considering, however, education alone is not sufficient. Legal measures are also necessary, because knowing the right is not always equivalent to doing the right, when self-interest intrudes itself.

A certain German town, which Dr. Knopf tells about, was educated sufficiently to allow the presence of sanatoriums for the treatment of wealthy patients. A lung specialist, of wide reputation, desired to establish there a sanatorium for the poor. The townsmen refused to allow it, thinking that its presence would drive off their rich patients, and so he established it elsewhere. But the rich patients, arguing that there must be some special and remarkable efficacy in the air of the town selected by such a celebrated man, abandoned their original location and flocked to the new town. If in

this case the licensing power had been in the State instead of the town, the course of events might have been different.

No matter by whom licensed, every private sanatorium, whether charitable or organized as an investment, should be inspected by the proper authorities at regular intervals.

La Función de los Gobiernos Municipales en la Licensia de Sanatorios Privados Para Tuberculosis.—(CLAPP.)

Aunque los sanatorios públicos de caridad para los tuberculosos se multiplican rapidamente, en los Estados Unidos existen muy pocos sanatorios para la tuberculosos que tienen recursos suficientes para la vida. Existen muchas razones naturales las cuales impiden, bajo un punto de vista financiero, el aventurar la construcción de éstos; mas el mayor obstáculo entre todos es la muy infortunada *tisiofobia*, tan prevalente al presente, lo cual da por concecuencia que las mesas locales de salud, (cuando estás tienen poder) negan la licensia. Esto pudiera ser en parte remediado si el Estado en vez de la municipalidad, tuviera a cargo el poder de licenciar. Un oficial del Estado tiene un campo de vista mas ampleo y poseé mayor abilidad para decidir con imparcialidad tales asuntos. El naturalmente está mas libre de las intrigas locales y menos sujeto a las concideraciones personales á las cuales estan expuestos los jefes locales en su propia ciudad. La licencia puede ser dada por el Gobernador del Estado después de haber este consultado con la Comisión sobre Tuberculosis del Estado ó con la comisión a cargo de los Sanatorios del Estado: ó bien la Mesa de Salud puede actar en la capacidad de consejero. Tal mesa deberá ser una Mesa de Apelación, a lo menos, si bien las autoridades locales retienen el poder de la licencia en la primer instancia.

A todo trance, sinembargo, sea cual fuere el plan, no debiera ofrecersele obstaculos á las personas responsables en el procuramiento de una licencia para establecer tales instituciones, antes bien debiera ayudarseles en vista del bien que éllas hacen, y también bor la educación pública; una educación del público es la mejor corrección que puede hacerse contra la tisiofobia.

Fonction du gouvernement municipal pour licencier le sanatorium privé pour la tuberculose.—(CLAPP.)

Bien que les sanatoriums publics de charité pour les tuberculeux se multiplient rapidement, il n'y a dans les États-Unis que peu de sanatoriums

pour les tuberculeux riches. Il y a beaucoup de raisons naturelles pour ne par courir le risque d'en établir un si l'on considère comme il présente peu d'avantages financiers. Mais le plus grand obstacle de tous est cette infortunée *phthisiphobie* qui règne partout maintenant et dont le résultat est si souvent que les bureaux de santé locaux refusent de les licencier, alors qu'ils en ont le pouvoir. Ceci pourrait être remédié en partie si l'état, plutôt que la municipalité, exerçait le pouvoir de licencier. Un fonctionnaire de l'état (ex officio) a un point de vue plus large et une capacité plus grande pour décider des questions de ce genre avec plus de justice et d'impartialité pour tous. Il est naturellement plus débarrassé des préju sous locaux et moins l'influence de considérations personnelles qu'un fonctionnaire municipal dans sa propre ville. La licence pourrait être accordée par le Gouverneur de l'État après avoir consulté la Commission de l'État contre la Tuberculose, ou le Conseil d'Administration chargé du Sanatorium de l'État ou le Bureau de Santé de l'État pourrait être consulté. Ce Bureau devrait être un tribunal d'appel tout au moins, même si les autorités locales retenaient le pouvoir de licencier en première instance. En tous cas, quel que soit l'arrangement choisi, il devrait être facile pour les personnes compétentes d'obtenir une licence pour établir ces institutions qui devraient être encouragées pour le bien direct qu'elles font, et aussi pour instruire le public, car l'éducation du public est le meilleur remède contre la tuberculose.

Über die Function der Stadtverwaltung bei Genehmigung von Privatheilanstalten für Tuberkulöse.—(CLAPP.)

Obzwar die Zahl von wohlthätigen, öffentlichen Heilanstalten für Tuberkulöse stets zunimmt, so giebt es doch in den Vereinigten Staaten sehr wenige solche Anstalten für wohlhabende Kranke. Es giebt viele natürliche Ursachen, weshalb es vom finanziellen Standpunkte aus so wenig verlockend ist, das Risiko der Gründung einer solchen Anstalt zu übernehmen. Das allergrösste Hindernis ist indess die gegenwärtig leider so vorherrschende *Phthisiophobie*, welche oft die Veranlassung ist, dass die localen Gesundheitsbehörden (wo dieselben das Recht dazu haben) die Genehmigung zur Gründung einer solchen Anstalt verweigern. Dem könnte theilweise abgeholfen werden, wenn anstatt der städtischen Verwaltung die Befugniss zu derartigen Genehmigungen dem Staate überlassen bleiben würde. Ein Staatsbeamter kann (ex officio) das Feld weiter übersehen und vermag in solchen Fragen besser zu entscheiden, und jedem Recht und Gerechtigkeit angedeihn sein lassen. Ein Staatsbeamter ist natürlicher Weise freier von örtlicher Voreingenommenheit und wird weniger von persönlichen Rück-

sichten beeinflusst, als ein städtischer Beamter in seiner eigenen Stadt. Die Genehmigung könnte von der Verwaltung des Staates, nach Berathung mit der Staatscommission für Tuberkulose, oder mit dem Verwaltungsrath der staatlichen Heilanstalt, ertheilt werden. Eventuell könnte auch das Staats-Gesundheitsamt als berathende Körperschaft dienen. Es sollte wenigstens eine solche Körperschaft als Berufungsinstanz vorhanden sein, wenn auch die Localbehörden die Befugniss, Genehmigung zu ertheilen, in erster Linie behalten sollten. Mag der eine oder der andere Plan gewählt werden, so sollte es auf jeden Fall mit keinen Schwierigkeiten verknüpft sein, für die geeignete Person eine Genehmigung zur Eröffnung einer solchen Anstalt zu erlangen. Solche Unternehmungen sollten im Gegentheil ermuntert werden, in Anbetracht des guten, welches sie direct verursachen und auch zur Erziehung des Volkes beitragen. Die Erziehung des Volkes ist das beste Mittel gegen die Phthisiophobie.

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

SIXTH SESSION.

Thursday Morning, October 1, 1908.

Section VI was called to order by the President, Surgeon General Walter Wyman, on Thursday morning, October 1st, at half-past nine o'clock.

AN ASPECT OF THE EVOLUTION OF THE STATE IN ITS RELATIONSHIP TO TUBERCULOSIS.

A PLEA FOR NATIONAL HEALTH DEPARTMENTS.

By F. G. Bushnell,
London.

The State, its ministers and officers, as the representatives and leaders of a nation's life and thought and actions, are in touch with many of the problems which lie at the root of tuberculosis. Among them, the one with which my work familiarizes me above others is the application of laboratory procedures to public health measures.

The subject of the development, coördination, and ultimate perfection of such an applied scientific system as bacteriological and pathological examinations to the national need follows naturally; and, in sequence, this suggests certain general reflections as to the public health service as it exists, without which the structure would appear incomplete.

There seems to be little need to argue in this presence the desirability of the establishment, equipment, and proper maintenance of laboratories for the study of the causes, and as an aid in the prevention, of transmissible diseases of men and animals. The fact is, however, that wide gaps exist in most national bacteriological systems, and no country, no county, no uni-

versity, no city, no hospital, can keep abreast of the march of progress unless it is provided with suitable laboratories and appliances for scientific work; neither can they even carry out their work efficiently.

The discoveries of Koch, Pasteur, and Lister in the last century have had such a profound influence upon the comfort, health, and welfare of people in general that there is a wide-spread, if inadequate, appreciation of the value of scientific investigation. It is to this we owe in Great Britain, and, as I believe, in America, the pecuniary resources we have for scientific progress, but the State is taking more and more its proper share in what has been termed the "socialization of medicine." Enthusiasts go so far as to profess that the medicine of the future will be largely preventive, and that practitioners will be divided into two classes: those who specialize in public hygiene and will be in the government, county, or municipal service; and those who engage in the practice of personal hygiene, that is, general or consulting medical practice.

No sharp line can, however, be drawn between a pathologist and a physician, for the former is a physician engaged in acquiring facts in the laboratory or at the autopsy for the purpose of verifying or supplementing those obtained by the practitioner at the bedside. The work of each is important, and the conclusions should be arrived at in consultation. The first pathological laboratory was established by Virchow in Berlin in 1856, and this has been the model of the general plan of organization for nearly all pathological laboratories subsequently constructed in Germany and other countries. The idea of a laboratory as an integral part of a hospital is of recent origin in Great Britain, and may be traced to Hughes Bennett and Beale. According to Professor W. H. Welch, the credit of first establishing a public health laboratory belongs to Pettenkofer. State medicine thus first obtained its domicile in 1872 from the Bavarian Government. This admirably equipped laboratory was opened for students in 1878. Such laboratories are the glory to-day of German universities, which possess over two hundred of them, and by their aid Germany has secured, since the middle of the last century, the palm for scientific education. It is generally recognized—and nowhere more generally, it is said, than in the United States—that where laboratory facilities are the most ample and available, there are developed the largest number of trained workers who make most discoveries.

The relationship between public health and pathology is intimate, and one of the best examples, perhaps, is routine examination of sputum suspected of containing tubercle bacilli. It has long been accepted that the sputum of a patient with pulmonary tuberculosis may be a potent source of danger to others, containing, as it may, virulent tubercle bacilli. These may retain their vitality in the dry state for eight to ten weeks and then be infectious. Tuberculosis accounts for 60,000 deaths a year in Great Britain and Ireland.

Is it not, then, permissible to say, with Bezly Thorne, that the gratuitous examination of sputum, milk, and meat for Bacillus tuberculosis is as much a national concern as is vaccination?

There are many other diseases, information on which equally depends upon laboratory examinations very largely, and the conclusion is that the laboratory is an integral part of the general public health machinery. This is recognized by some of the largest cities and county councils in the United Kingdom which have had laboratories in operation for a number of years in connection with their sanitary departments. There still remain large areas unprovided for, and these must look to their county councils and to the central health authorities. Without such arrangements they are practically destitute of a valuable aid in the detection of foci of disease. The executive officer depends, in addition, partly upon information from the laboratory as to conditions that exist, as a guide to his action for the protection of the public. Professor F. F. Wesbrook considers that the laboratory official is trained nowadays so that he can acquire knowledge on the spot which may be of the greatest importance to the administrative officers, and his services should be available. The problems connected with tuberculosis that remain to be worked out in the laboratory alone require systematic and concerted research.

These facts may be accepted as strong evidence of the need for the organization of gratuitous bacteriological examinations on a national scale, as adjuncts to existing sanitary departments, so that no part of the country may be deprived of such advantages.

If this premise is accepted, the outcome is that the bacteriologist should be placed in the ranks of public health officers, and should be a member of the sanitary service.

Such a strengthening of the service may be regarded as part of a great problem of far-reaching interest and gravity, which is ripe for consideration and discussion. It is the central coördination of all preventive measures in a national health department presided over by an expert non-party minister of high rank and power.

Professor J. G. Adami has said that all Anglo-Saxon institutions advance by compromise. Which is the line of least resistance in a matter which affects the welfare of nations? Will this meeting determine the cleavage of public apathy? Hasty conclusions must on every account be avoided. Very eminent authorities consider that the time is not even yet ripe for such a development, but it is well known that there are many statesmen and distinguished medical men, both in this country and in other English-speaking lands, who have identified themselves with such an institution based on their existing ones. The main idea that actuates most people is that, given a leader in public health, great improvements in organization will follow.

Men who would follow a Roosevelt, a Napoleon, or a Booth, would be as profoundly influenced by a Pasteur or a Lister of public health.

There are obvious considerations on either side. There is the sturdy Anglo-Saxon respect for local institutions and local independence; there is the possibility of overcentralization, in which the central machinery may be out of proportion to the peripheral equipment and appliances. There is the proper desire for the growth of public opinion to be proportionate to the evolution of State guidance. Without any doubt, there is too great a gap already existing between the masses of our countrymen and those who are educated or even familiar with this aspect of medicine. How can this gap be bridged so that the really great stores of scientific knowledge that do exist can be rendered available?

The introduction of the fundamental principles underlying health and disease, into national educational systems, will undoubtedly pave the way for advance, so that public opinion will in time support whole-heartedly the medical practitioner and the health officer in his daily work. This is one but not the only path, and certainly it will be a long one before the complete organization of State medicine at all comparable to municipal sanitation in its sphere is attained. An appeal to the intellect is not always successful. Long experience has shown that mere agitation, and certainly panic, may gain more than the presentation of evidence based on reason. There are no true national boundaries in questions of health. Just as does religion, so should public health, unite all peoples in its cause. Great meetings such as this have a wide-spread influence, and it is by such assemblies that we may expect to devise a means by which all countries may move together in the consolidation of their health services and the development of ministries of public health.

(Suggestion: The appointment of a standing international council to meet at congresses on tuberculosis and hygiene and report progress.)

Evolución del Estado en su Relacion con la Tuberculosis.—(BUSHNELL.)

1. El estado, sus ministros y empleados representan pensamientos nacionales y vida.

2. El estado está ya en contacto con mucho de los problemas que estan a la base de la tuberculosis.

3. Entre ellos esta la aplicación de los metodos de laboratorio, las medidas de Salud Pública y la Medicina Preventiva.

4. Dr. Bezly Thorne incita que la examinación gratis, hechas por todas las Autoridades de Sanidad, del bacilo de la tuberculosis en el esputo, leche y carnes, es de un gran comento nacional como lo es la vaccina en la Gran Bretana é Irlanda.

5. La fundacion, segun los arreglos presentes, de un sistema nacional coordinado para los exámenes bacteriologicos y patológicos, de enfermedades trasmisibles al hombre y los animales, a las espensas del pueblo, es rasonable en la Gran Bretana.

6. El primer laboratorio de Patologia fué fundado por Virchow en Berlin en 1856 y el primer laboratorio de Salud Pública fué fundado por Pettenkofer en 1878. Hughes Bennett y Beale fueron identificados con los laboratorios de hospital en la Gran Bretana. (Prof. W. H. Welch, "The Evolution of Modern Scientific Laboratories.")

7. En la Gran Bretana é Irlanda tales administraciones sanitarias como condados y ciudades, tienen en operación laboratorios de salud pública, pero muchos distritos centrales carecen de ellos. La necesidad de la cooperacion de los laboratorios de los condados con los laboratorios de las universidades, colegios de Medicina y hospitales, en cuanto es posible, existe en la Gran Bretana a fin de llevar a cabo los trabajos rutinarios, investigaciones é instruccion.

8. El bacteriologista como un empleado de la salud publica y miembro del servicio sanitario, en igual importancia y provecho con los empleados administrativos.

9. La coordinación central de la salud pública en las medidas preventivas hacia el origen y prevencion de la tuberculosis en los departamentos de salud pública nacional, con jefes expertos (ministros) de alto rango y gran poder a la cabeza.

10. La posición actual de las naciones inglesas (los Estados Unidos, Canada, la Gran Bretana é Irlanda, y Nueva Zelanda), con relacion a los ministros de la Salud Publica.

Una sugestion.

Que como la Higienie no tiene limites, Un Consejo Internacional debiera organizarse cuyo objeto será vigilar y fomentar el engrandesimiento de los Departamentos Nacionales de Salud Publica.

L'État dans ses Rapports à la Tuberculose.—(BUSHNELL.)

1. L'État, ses ministres et ses officiers représentent la pensée et la vie nationales.

2. L'État se trouve déjà en rapport avec beaucoup des problèmes qui sont à la base de la tuberculose.

3. Entre autres nous citerons l'application des procédés de laboratoire aux mesures pour la santé publique et à la médecine préventive.

4. M. le docteur Bezly Thorne insiste que l'examination gratuite des crachats, des lait et des viandes pour le bacille de la tuberculose par toutes

les autorités sanitaires est tout autant affaire nationale qu'est la vaccination dans la Grande Bretagne et l'Irlande.

5. Le développement d'un système national coördiné d'examens bactériologiques et pathologiques, aux dépens de l'ètat, des maladies transmissibles d'hommes et d'animaux est tout-à-fait raisonnable dans la Grande Bretagne.

6. Le premier laboratoire pathologique fut celui de Virchow à Berlin en 1856 et le premier laboratoire pour la santé publique fut celui de Pettenkofer en 1878. Hughes Bennett et Beale s'identifièrent avec les laboratoires des hôpitaux en Grande Bretagne et en Irlande. (Prof. W. H. Welch, "L'évolution des laboratoires modernes scientifiques.")

7. En Grande Bretagne et en Irlande les conseils de comté et les conseils municipaux ont organisé des laboratoires à santé publique, mais il en manque en beaucoups d'autres arrondissements. Il existe un grand besoin en Grande Bretagne et en Irlande pour des laboratoires municipaux travaillant en coöperation avec ceux des universités, des écoles médicales et des hôpitaux pour enseigner et pour développer les recherches et les investigations.

8. Le bactériologiste comme officier de santé publique et membre du service sanitaire, doit être de position et d'émoluments pareils à ceux de l'officier administratif. (Division pathologique du service sanitaire).

9. La coördination centrale des mesures sanitaires et préventives en rapport à l'origine et à la dissémination de la tuberculose dans des départements de santé publique, sous des ministres habiles (non-politiques) d'un rang élevé.

10. La position actuelle des nations parlant anglais (i.e. les États-Unis, le Canada, la Grande Bretagne et l'Irlande et la Nouvelle Zélande) envers les ministres de santé publique.

Une suggestion que, puisque l'hygiène ne connaît pas de limites, un conseil international permanent soit établi pour surveiller le développement d'un département de santé nationale.

Ein Überblick der Massnahmen des Staates in seinen Beziehungen zur Tuberkulose.—(BUSHNELL.)

1. Der Staat, seine Minister und Beamten repräsentieren die Gedanken und das Leben der Nation.

2. Der Staat ist bereits in Berührung mit vielen Problemen, die sich mit der Wurzel der Tuberkulose beschäftigen.

3. Unter diesen, in der Anwendung der Laboratoriumsarbeit im Interesse der öffentlichen Gesundheit und Massnahmen vorbeugender Heilkunde.

4. Dr. B. Thorne dringt darauf, dass die zufriedenstellende Untersuchung von Sputum, Milch und Fleisch durch autorisierte Gesundheitsbeamte

ein ebenso grosses nationales Erfordernis ist, wie die Impfung in Grossbritannien und Irland.

5. Die Entwickelung der gegenwärtigen Verhältnisse eines zusammenarbeitenden Systems bakteriologischer und pathologischer Untersuchung als öffentliches Erfordernis übertragbarer Krankheiten von Menschen und Tieren ist in Grossbritannien in anerkennenswerter Weise durchgeführt.

6. Das erste pathologische Laboratorium war das Virchow's in Berlin im Jahre 1856 und das erste öffentliche Gesundheitslaboratorium war das Pettenkofer's im Jahre 1871. Hughes, Bennett und Beale waren mit Hospitallaboratorien in Grossbritannien und Irland identifizirt. (Prof. W. H. Welch, "Die Entwicklung moderner wissenschaftlicher Laboratorien.")

7. In Grossbritannien und Irland haben viele Grafschaften und Städte in ihren für die öffentliche Gesundheit dienenden Sanitäts-Einrichtungen öffentliche Gesundheitslaboratorien vorgesehen, doch ist in vielen Landdistrikten noch ein Mangel darin vorherrschend. Die Notwendigkeit für Landlaboratorien, die mit den medizinischen Schulen zusammenarbeiten, hat sich in Grossbritannien und Irland als notwendig erwiesen wo immer es möglich sei, da dadurch die nötigen Kenntnisse und die erforderliche Routine in gleicher Weise verbreitet werden.

8. Der Bakteriologe als öffentlicher Gesundheitsbeamter und Mitglied des Gesundheitsdienstes gleichwertiger Staaten arbeitet mit dem administrativen Beamten zusammen. (Pathologische Abteilung des Sanitätsdienstes.)

9. Die centralisierte Zusammenarbeit der gesundheitsamtlichen Massnahmen in Beziehung zum Ursprung und zur Verbreitung der Tuberkulose im nationalen Gesundheitsdepartement, welches keine Vorstände (oder Minister) von hohem Rang und Machtstellung an ihrer Spitze erwartet.

10. Die gegenwärtige Stellung der englischsprechenden Nationen (die Vereinigten Staaten, Canada, Grossbritannien und Irland, Neu-Seeland) in Beziehung zur öffentlichen Gesundheitspflege.

Ein Vorschlag: Da die Hygiene keine Grenzen kennt, sollte ein ständiges internationales Amt geschaffen werden, welches das Wachstum der nationalen Gesundheitsämter beobachten und fördern sollte.

FEDERAL HEALTH ORGANIZATION.

By Professor Irving Fisher,
New Haven.

The Committee of One Hundred on National Health, of the American Association for the Advancement of Science, was organized in the spring of 1907. Its aim is to secure a bureau or bureaus of health under the Federal government, as it is believed that in this way tuberculosis and other diseases can be most successfully reduced. The committee has received the cordial support of President Roosevelt, the late ex-President Cleveland, Mr. Taft, Mr. Bryan, the governors of various States, and senators and congressmen.

Last summer the health plank of the Committee of One Hundred was adopted in the platforms of the Republicans, Democrats, and of the Independence League. The Republican platform read:

"We commend the efforts designed to secure greater efficiency in national public health agencies and favor such legislation as will effect this purpose."

The Democratic platform read:

"We advocate the organization of all existing national public health agencies into a national bureau of public health, with such power over sanitary conditions connected with factories, mines, tenements, child labor, and other such subjects as are properly within the jurisdiction of the Federal government and do not interfere with the power of the States controlling public health agencies."

The movement has the indorsement of the American Medical Association and other medical organizations, the American Public Health Association and other hygienic organizations, the United Mine Workers of America and other labor organizations.

It is closely linked with the movement toward the preservation of our natural resources. In the peroration of President Roosevelt's famous speech before the conference on the Conservation of Natural Resources he said: "Finally, let us remember that the conservation of our natural resources, though the gravest problem of to-day, is yet but part of another and greater problem to which this nation is not yet awake, but to which it will awake

in time, and with which it must hereafter grapple if it is to live—the problem of national efficiency."

There already exists at Washington a Public Health and Marine Hospital Service, but its work is chiefly confined to quarantine, to the care of sick sailors, and to the examination of antitoxin at its hygienic laboratory. There is also the Bureau of Pure Foods, presided over by Dr. Wiley, and in the Census Office there is a Division on Vital Statistics. A proposition which has found favor with many in Congress is to utilize the Department of the Interior by transferring from it most of the bureaus not connected with health or education and to transfer to it the various scattered health agencies now in other departments. To the nucleus thus formed it is hoped to add a bureau of medical investigation and a children's bureau.

There is much difference of opinion as to the extent to which the Federal government may constitutionally exercise health powers, but the committee is taking pains to avoid any controversy on this point by confining its recommendations to research and publication, entering into the field of regulation only so far as it affects interstate relations or the District of Columbia. It is hoped that the national capital may become a model city in sanitation as well as in other respects, in accordance with President Roosevelt's well-known plans. By holding up high standards in public and personal hygiene, the national government will aid in the national efficiency, not only directly, but by giving greater prestige and in stimulating to redoubled activity the work now being done by State and municipal boards of health. Public opinion holds sway in matters of health as elsewhere. It is largely for the purpose of impressing public opinion that these international congresses on tuberculosis are held. It is believed that a Federal organization of health, by persistently upholding health ideals, and by the demonstration of methods of attaining and maintaining health, will keep the public interest from flagging.

First and foremost among the specific problems to be treated by this national organization is the problem of tuberculosis. At present circulars and pamphlets of information are issued by many State boards of health which might with great advantage be issued by one authoritative central bureau and utilized by all. The circulation of such pamphlets, if issued by the Federal government, would be far wider, the cost of distribution far less, and the authority and ability of those who write them would be much greater. Already the Bureau of Animal Industry in the Department of Agriculture has made important contributions to tuberculosis, not only by inspection of meats, but still more by the investigation of tuberculosis in dairy products, particularly butter. Several bills are now before Congress relative to tuberculosis, and one was passed at the last session making compulsory the notification of cases of tuberculosis in the District of Co-

lumbia. The expansion of such work through a powerful national organization of health would not only give a great impetus to the "crusade against tuberculosis," but would utilize this crusade to bring about an improvement in American health generally.

La Organización Federal de Salud.—(FISHER.)

El Comité de los Cien sobre la Salud Nacional, se esfuerza en promover el aumento, centralizacion y extension del Bureau de Salud. El movimiento hacia la conservacion del vigor nacional, esta conectado por diferentes modos con el movimiento hacia la conservacion de los recursos naturales. El Presidente Roosevelt en la oracion de su famoso discurse de la Casa Blanca dice: "Finalmente permitasenos recordar la preservacion de nuestros recursos naturales, aunque el problema mas grave del presente, aun todavia no es sino una parte de otro problema mas grande al cual la nacion aun no se ha despertado, mas que se despertara á su tiempo, y sobre el cual debe apoyarse si es que pretende existir—el problema de la eficiencia nacional."

No se pretende traspasar los limites del Departamento de Salud del Estado. El pensamiento se limita solamente mas bien á levanter el Departamento de Salud á un estado de mayor actividad. Un método para llevar á cabo esto consiste enhacer de la ciudad de Washington, sobre la cual el Gobierno Federal tiene dominio, una ciudad modelo en la Higiene.

ZUR BEKÄMPFUNG DER TUBERKULOSE IN DEN GEMEINDEN.

Von Dr. Benö Farkas,
in Komárom (Ungarn).

Die Tuberkulose lastet wie eine egyptische Plage auf der Menschheit, sie fügt der Volksgesundheit die schwersten Verluste zu, fordert hunderttausende Leben als Opfer. In Anbetracht ihrer verheerenden Wirkung kann ihre Bekämpfung nur mit grossem Aufwand von entsprechenden Institutionen, materiellen Opfern und Mühe von Erfolg begleitet sein.

Eines der bewährtesten Mittel im Kampfe gegen die Tuberkulose ist das weitverbreitete, auf die Unterstützung der Versicherungsanstalten und dem Kassenwesen beruhende Heilstättenwesen. Die Errichtung und Erhaltung von Heilstätten haben ohne Zweifel zu den erzielten therapeutischen Erfolgen wesentlich beigetragen; doch zeigte es sich bald, dass zur Bekämpfung der Tuberkulose, in Anbetracht der grossen materiellen Opfer für die Unterbringung der Tuberkulösen in Heilstätten, das Budget der Gemeinden nicht ausreicht.

Neben diesen und ähnlichen Anstalten empfehlen sich für Ungarn die Fürsorgestellen (dispensaires).

Für die Mehrzahl der Tuberkulösen, welche in keiner Heilanstalt Aufnahme finden, in ihren Wohnungen zur Infection beitragen und so ihre Umgebung gefährden, sind die Fürsorgestellen—Dispensaires für Lungenkranke nach dem Beispiele von Belgien und Frankreich—in ihrer segensreichen Wirkung von höchster Bedeutung.

Die Wichtigkeit der Errichtung der Dispensaires im Kampfe gegen die Tuberkulose wurde auch in Ungarn anerkannt und zur Errichtung und Förderung dieser Institution beigetragen. Der Anfang damit ist bereits gemacht und wie auf Anregung des durch seine grossen Verdienste im Kampfe gegen die Tuberkulose bekannten Professor v. Korányi vor zehn Jahren bereits das erste Sanatorium für Lungenkranke in der Nähe der Hauptstadt errichtet worden war, dem ein zweites und drittes folgte, ist die Errichtung von Dispensaires im Zuge. Die bereits in Wirksamkeit befindlichen Dispensaires nehmen die Kranken und deren Angehörigen in ihren Schutz, gewähren denselben nötigen Falls auch materielle Hilfe unter der Bedingung, dass dieselben den Massnahmen zu fügen sich verpflichten,

soweit diese ein Gebot der Hygiene bilden, zur Hintanhaltung der Infection in der Familie beitragen. In den Dispensaires sollen auch diejenigen, die sich krank fühlen, nötige Aufklärung und ärztlichen Rat finden. Seitens der Verwaltung sollte auch nötigen Falls bei der Ortsbehörde die Desinfection verseuchter Wohnungen angeregt und veranlasst werden. Gut geleitete Dispensaires können auf die Sympathie und Unterstützung der Bevölkerung, sowie der Wohlfahrts-Anstalten rechnen.

In der Reihe der zur Bekämpfung der Tuberkulose dienenden Einrichtungen ist die Anzeigepflicht der Tuberkulose-Erkrankungen ein wichtiges Glied. Die Frage, ob die Anzeigepflicht auf alle diesfällige Erkrankungen, oder nur auf die für die Umgebung des Kranken gefahrdrohenden Fälle auszudehnen sei, wurde vielfach ventiliert und die allgemeine Anzeigepflicht für unbedingt notwendig erklärt. Es wurde auf die klinische Diagnose hingewiesen, welche durch die v. Pirquet'sche Impfpapel sowie der Conjunctival-Einträuflung erzeugte Reaction eine wesentliche Bereicherung erfahren hat, damit der Einblick über die Ausbreitung der Krankheit erleichtert sei. Es wurde ferner geltend gemacht, dass die allgemeine Anzeigepflicht ebenso gerechtfertigt und geboten sei, wie bei den acuten Infectionskrankheiten (v. Schrötter).

Was die Bereicherung der klinischen Diagnose betrifft, können die diesbezüglichen Arbeiten noch nicht als abgeschlossen gelten.* Die Diagnose stösst in ihrer latenten Form, in ihrer ganzen Eigenart auf Schwierigkeiten. Die Tuberkulose ist auch mit den acuten Infectionskrankheiten, welche den Kranken überfallen und in verhältnismässig kurzer Zeit ihren Verlauf nehmen, nicht auf eine Stufe zu stellen. Sie setzt oft im Beginne ohne besondere Beschwerden schleichend ein, was bei den acuten Infectionskrankheiten nicht zutrifft.

In Staaten, in welchen die Arbeiterversicherung, das ausgebreitete Kassenwesen die Grundlage für die Tuberkulose-Bekämpfung bildet, die Unterbringung und Versorgung der Kranken gesichert ist, mag die allgemeine Anzeigepflicht als Stütze des vorbeugenden Verfahrens am Platze sein, während sie dort, wo Armut eine der ergiebigsten Quellen der Krankheit ist, der Staat für die Unterbringung der Kranken nicht in genügender Weise zu sorgen vermag, die allgemeine Anzeigepflicht nicht den Erwartungen entsprechen kann.

In Anbetracht der Verhältnisse ist in Ungarn die partielle, beschränkte Anzeigepflicht der allgemeinen vorzuziehen, und wäre auszudehnen auf:

a. Tuberkulöse Kranke, welche in den Heilanstalten aufgenommen, entlassen oder gestorben sind.

* Cohn: Über Ophthalmoreaktion auf Tuberkulin, Berlin. klinische Wochenschrift, 1907, No. 47. Ernst Levy: Vortrag im Verein für innere Medicin, Berlin, 1907, xii, 16. Dach: Zur Kenntniss der kutanen Impfpapel nach v. Pirquet, Med. Klinik, Wien, 1908, No. 2.

b. Bei wohnen von Tuberkulösen in einem Hause, welches als Collectivwohnung dient, die Mitbewohner mit Infection gefährdet. Bei Wechsel der Wohnung und nach Todesfall.

c. Auf, an Tuberkulose leidende Dienstboten, Ammen, Köche in Kaffee- und Gasthäusern, Restaurants, Pensionen, Milchwirtschaften Bediensteten.

d. Schulen besuchende tuberkulöse Schüler.

e. An, aus dem Militärstande wegen Tuberkulose Entlassenen, aus dem Heere Ausgeschiedenen.

Über diese sollten von der Militärbehörde in jedem Falle die Anzeige an die Civilbehörde gemacht werden, damit letztere dahinwirken, dass die Kranken in Heilanstalten untergebracht, die Verbreitung der Krankheit innerhalb der Civilbevölkerung verhindert werde.

The Prevention of Tuberculosis in Communities.—(FARKAS.)

1. In view of the conditions existing in Hungary, encouragement should be given to the building of sanatoriums and the establishment of more *supporting dispensaries* for consumptives who lack the means to care for themselves.

2. *Disinfection.*—Dwelling houses should be disinfected by the local authorities at the request of the supporting dispensaries, and disinfection should take place in every tenement that has been occupied by a consumptive or in which a consumptive has died.

3. *Compulsory Notification.*—Compulsory notification is called for wherever consumptives are cared for, either in their homes or in institutions. Partial notification should be extended to the following cases:

(*a*) Tuberculous patients who have been admitted to sanatoriums or have been discharged, or have died.

(*b*) When consumptives live in a house which is shared by others, who are, therefore, exposed to the infection.

(*c*) Servants, nurses, cooks in restaurants and hotels, boarding houses, and dairy employees.

(*d*) Tuberculous school-children.

(*e*) Those who have been dismissed from the army on account of tuberculosis.

La Prevención de la Tuberculosis en las Comunidades.—(FARKAS.)

1. En vista de las condiciones existentes en Hungaria, debiera fomentarse la construcción de mas sanatorios, y más aun la instalación de dispensarios gratis para los tísicos á los cuales les faltan los recursos necesarios para curarse éllos mismos.

2. Las habitaciones deberán ser desinfectadas por medio de las autoridades locales á petición de los dispensarios gratis y la desinfección deberá hacerse en cada casa que ha sido ocupada por un tísico ó en donde un tísico ha sucumbido a la infección.

3. Notificación obligatoria: La notificacion deberá hacerse de todos los casos de tuberculosis, bien sea en los hogares ó en las instituciones. La notificación deberá comprender particularmente los casos siguientes:

(*a*) Pacientes tuberculosos los cuales han sido admitidos en los sanatorios, á los que se les ha dado de baja ó los que han fallecido.

(*b*) De los tísicos que viven como inquilinos y que por lo tanto expone á los otros a la infección.

(*c*) De los sirvientes, nodrizas y enfermeras, cocineras en los restuarantes y hoteles ó en casas de huespedes y los empleados en las lecherias, afectados de la enfermedad.

(*d*) De los niños tuberculosos en las escuelas.

(*e*) De aquellos que se les ha dado de baja en el ejercito a consecuencia de la afección.

Prévention de la Tuberculose dans les Communautés.—(FARKAS.)

1. Étant donné les conditions existant dans la Hongrie, il faudrait y encourager l'établissement de sanatoriums et y augmenter le nombre de 'dispensaires antituberculeux' (supporting dispensaries) pour les tuberculeux qui, n'ayant pas les moyens de se soigner, contribuent à la propagation de la maladie.

2. Désinfection: Les habitations devraient être désinfectées par les autorités locales à la requête des dispensaires, et l'on devrait désinfecter tout logement qui a été occupé par un tuberculeux ou dans lequel un tuberculeux est mort.

3. Déclaration obligatoire. On doit enregistrer tous les tuberculeux soignés à domicile ou dans une institution. On fera une déclaration partielle dans les cas suivants:

(*a*) Malades tuberculeux admis dans les sanatoriums, renvoyés des sanatoriums, ou décédés;

(*b*) Tuberculeux qui partagent le logement d'autres personnes, les exposant ainsi à la contagion;

(*c*) Domestiques, garde-malades, cuisiniers de restaurants, hôtels et pensions, et les employés de laiteries;

(*d*) Écoliers tuberculeux;

(*e*) Soldats renvoyés de l'armée pour cause de tuberculose.

A GREAT NATIONAL PROBLEM.

By Dr. C. A. L. Reed,
Cincinnati.

The text of my address to-day is to be found in a few important facts. Tuberculosis alone causes the death of 160,000 persons and the constant illness of a half million more each year in the United States. The disease is preventable.

The United States to-day has no national public health agency vested with power competent to cope with the evil. Both of our great political parties have this year committed themselves to the creation of such a national public health agency; and, yielding to the agitation inaugurated by Dr. C. G. Comegys, of Cincinnati, at the meeting of the American Medical Association in this city in 1891, and since continued by that organization in connection with other organizations that have later joined in the movement.

The President has signified his intention to bring to the attention of Congress, at its session in December, specific proposals looking toward the correction of this unfortunate defect in our own governmental organization.

The object of my remarks is not to impress this great body of scientists from every quarter of the world, for that is unnecessary; but through this body to impress the people of this country with the extreme importance of supporting these proposals, to the end that lives shall be saved; and that this shall be better done, that science shall be given due honor in the practical government of man.

The Greatest Human Asset.—In approaching this question let us remember that the basis, the very fundamental basis, of prosperity is the productive energy of the people. We have been hearing much of our natural resources. The soil, the mines, the waterways, and the forests have each been enumerated as an asset. Yet each of them would be as worthless as the sandy stretches of the Sahara without the developing power of the greatest of all our natural resources—human labor and human intelligence. It is, therefore, the human factor, first, last, and all the time, that counts. Yet I am sorry to say that it is a factor that is taken all too little into account by our publicists when they assume to talk learnedly on the great problems of national economics. This, I regret to say, arises too much from the fact that,

with them as with the people generally, human life has become a mere emotion, and not much of that, without even being recognized as a unit of value translatable into terms of dollars and cents.

Yet I am confident that the chief national legislation of the immediate future, as already indicated, will be based upon the fact that a man's energy is his best asset, and that its full value depends upon his health and his length of years.

Scattered National Health Agencies.—This movement is fostered not only by human and economic considerations, both of which I shall discuss at greater length later on, but by the fact, as already intimated, that the existing public health agencies established from time to time by our national government are insufficient and incoördinate, and, to that extent and in consequence of that fact, are both unnecessarily expensive and disastrously inefficient in coping with this devastating evil.

In the first place, they are scattered throughout the various departments of the government. In consequence of this arrangement, or lack of arrangement, the Secretary of the Treasury is now the chief health officer of the United States. The Secretary of Commerce and Labor is in charge of the very fundamental basis of a health department, namely, the bureau of vital statistics. The Secretary of Agriculture has the enforcement of the most important public health law that has recently been enacted, namely, that relating to pure food and drugs. The Secretary of the Interior is the sanitary administrator of the Territories, of the Indian tribes, and of the great national eleemosynary institutions. The Secretary of War has charge of the sanitation of our insular possessions, including the Isthmian canal zone. The Secretary of the Navy and the Secretary of War, under the advice and direction of their respective surgeons-general, are of course in control, as they ought to be, of the health of, respectively, the navy and the army. Many other instances might be given to illustrate the fact that our national public health agencies, considered in the aggregate, are in no possible sense connected with a coördinating center or under the direction of an intelligent and purposeful centralized administration.

Results to the People.—This would be a matter of comparatively little concern if the results were not literally disastrous to the people. It is true that there are many things that are being done, and being well done, to protect the people against unnecessary disease and death. Our frontier quarantine is reasonably sufficient; our protection against plague and pestilence of foreign origin seems satisfactory; our immigration inspection is good; our pure food and drug administration is eminently satisfactory; while the sanitary triumph in the Isthmian canal zone marks an epoch in the protection of human welfare.

There are, however, many things that are not done under existing con-

ditions—things that ought to be done if we had a properly organized national department of public health.

Disastrous Warfare.—This is strikingly true of the great problem involved in the long, hard warfare here inaugurated in this country against an enemy, already camped in our midst, more numerous than all the men in all the armies and all the navies of all the world in all the ages—an enemy that is triumphantly taking from the American people each year victims in death more than equivalent to one whole army and two whole navies of the United States. But where one dies of tuberculosis many are ill—how many it is quite impossible to tell in the absence of information that could be gathered only through the instrumentality of a great national health agency, such as is now under serious advisement in governmental circles. I have been led to believe that in tuberculosis, mortality is to morbidity as one to five. If this is even approximately true, it follows that each year, while 160,000 people are dying of this disease, 800,000 are ill from the same cause. Invalidism induced by this cause is generally prolonged, varying from a few months to several years. One year is under the mean average duration of the disease. What does this mean? Statistics relating to a general condition spread all over three millions of square miles are not so impressive as if the same condition were concentrated and restricted to a more limited area.

Some Striking Illustrations.—Let us say, then, that every man, woman, and child in the State of Connecticut is stricken with this disease and remains an invalid for the space of an entire year, and that the deaths among them represented the entire population of New Haven with half of the population of Hartford. Or let us imagine that Indianapolis or St. Paul or Kansas City had suddenly dropped off the map. The disparity in population between these cities and the deaths that occur annually from tuberculosis is not sufficient to destroy the force of the comparison for the purpose of an object-lesson.

What is it Worth?—This sounds like strong language; it doubtless is strong language; but I challenge refutation of its accuracy. But strong as are the statements, startling as must be the illustrations, they will, I fear, fail to arouse action unless their meaning is expressed in dollars—it is not worth while to bother about the cents. In this computation our unit must be a human life. What is it worth? I am not asking the widow or the orphan. I am asking our publicists; I am asking the hundreds—yes, literally hundreds—of lawyers in Congress. But I ask them in vain. Their published utterances relate to money—always money—tariff money, railroad money, labor money, Standard-Oil money, to all kinds of money except the money that is represented in the very life of the money-earner himself. On this they are silent. So we must begin for ourselves.

The Equivalent in Coin.—A man's life is his capital; what he earns is

the interest on his capital. Most States make 6 per cent. a legal rate of interest. But make it 5, both for conservatism and easy counting. Then compute a man's wage, say, at a dollar and a quarter a day, for three hundred days in the year, as 5 per cent. of his capital. Then estimate on that basis the value of 160,000 lives and the value of the time of 800,000 persons for one year, and you begin to grasp the colossal money phase of this question viewed in its strictly economic aspects. Of course, many who die from tuberculosis are dependents, many are non-producers, and many who are producers do not earn a dollar and a quarter a day, and many do not work three hundred and sixty days a year. But it is likewise true that many, very many, of these victims have an earning capacity running high up into the thousands of dollars.

So it is probable that our units of computation are not far out of the way. But, still to be conservative, divide the aggregate loss then arrived at by two, and again by two, and you will still have enough left, which, if covered into the national treasury, would defray the running expenses of the army and the navy, build the Panama canal, and pay the national debt long before our outstanding obligations mature.

State and Federal Control.—In considering the question of a national department of public health in its relation to the control of tuberculosis one of the first conditions to be considered is the limitation, under the form of government, of the State and national governments, respectively, in the premises. It may be said that practically everything that is being done in the tuberculosis problem to-day is being done by the States by virtue of the police power reserved to them under the Constitution. This fact, more than any other one, aside from popular apathy on the whole subject, is probably responsible for the comparative dearth of results so far achieved. In the first place, the status accorded to sanitary authority in the States, as it is in the national government, is very generally, but not always, such as to give it neither educational value, moral force, nor adequate executive authority.

Uniform Laws—A Council of States.—The laws in the different States are generally inadequate, and, whether adequate or not, their complete lack of uniformity renders it impossible for the States to coöperate in the solution of a problem which, like this problem, is coextensive with all the States. Like laws for like conditions is the first requisite for the control of any national necessity by State legislation. And like laws by the States will probably not be enacted to any great extent until, under the initiative of the national government, the States shall send delegates to a representative body, a sort of council of States, which shall meet, as a legislature or Congress meets, in a session or sessions long enough to accomplish satisfactory results, and whose object shall be to formulate standard bills on various

subjects and send them back to the legislatures for enactment. In this way, and in this way alone, can the States move with anything like satisfactory rapidity in meeting the crying demand, for like laws for like conditions not only as relates to great sanitary problems, including the problem of tuberculosis, but as relative to many other problems that concern the economic and social welfare of all the people. This step should be taken without delay, for, even at the best, considerable time must elapse before results from this means can be realized.

Rights of the National Government.—In the absence of some such effort on the part of the States, or even with such effort, but recognizing that there is enough for both State and Federal governments to do, it seems to me that Congress, acting under the general welfare clause of the Constitution, is competent to take charge of the situation. This principle was recognized by the conference of governors of the Southern States held only a few years ago, and it had been adopted and acted upon by the general government as applied not only to maritime but to inland and to interstate quarantine of yellow fever. Acting on this principle and along lines parallel with those followed in the instances of yellow fever and bubonic plague, it becomes entirely competent for the national government, when necessary, to take charge of domiciliary sanitation, the absence of which is the one factor most responsible for the propagation of tuberculosis. The national government has the only power competent to enforce sanitation of railway coaches and steamboats engaged in interstate business and of steamships touching our ports. The Pullman coaches, next to tenement-houses, it would seem, from a study of all conditions, are probably the most potent factors in the dissemination of tuberculosis. The Federal government should have as much control over the migration of tuberculosis patients as over any other dissemination of a plague. The question of establishing great sanatoriums on government land reserves, and of colonizing them with tuberculosis patients from the crowded centers, is another detail, but one that can be solved best probably by the coöperation of the State and national authorities. And this reminds me to say that in all this great campaign the dominant idea must be that of coöperation, rather than antagonism between State and Federal authority, and that in every instance in which conflicting laws prevent such a consummation a way must be found by coöperative action to change the laws. This is not the land of Medes, neither of the Persians.

A Matter of Practical Legislation.—Then by all means let us have a dual plan of campaign against tuberculosis. Let us attempt, through a council of States, to secure uniform State laws touching this and other important questions. And let us have a strong Federal public health agency with which to do the national side of the work. About this latter proposition it seems to me there ought to be no particular difficulty. The existing national

public health agencies could be assembled by transfer from the various departments in which they are now located into some one of the existing departments, and there organized, under authority of additional law, on the basis of highest efficiency.

The Paramount Question of Status.—I have said that these agencies should be assembled in some existing department rather than organized into a separate and distinct department with representation in the cabinet. I have said this because there appear to be sound executive reasons why the cabinet should not be enlarged. At the same time I must insist that the fundamental importance of this health movement, as shown by this Congress, and by hundreds of other congresses and associations, demands that for its fullest efficiency it should be accorded the educational and moral force to be derived only by its titular recognition in the departmental scheme of our government. The two propositions are fortunately readily reconciled. This can be done by changing the name of the department in which the health agencies are assembled, thus avoiding the multiplication of cabinet officers. Thus it shall be found wise to make the bureau of vital statistics the receptacle for the aggregated service; the name of the department could be changed to that of "Commerce, Labor, and Public Health." Or if it shall be deemed expedient to select the Department of the Interior, the name of the department should be changed to that of "Education and Public Health," which, unlike the present, would mean something and stand for something distinctive among our national interests. But I insist, in the name of the medical profession, in the name of science, in the name of humanity, that a great governmental agency to conserve, as this one proposes to conserve, more lives, more homes, more property, and more money, than any other single agency in the whole plan of government, shall be accorded a status befitting its dignity and its worth to all the people.

DISCUSSION.

Dr. Liceaga, Mexican delegate, said that the paper which had just been read demonstrated the necessity which is being felt all over the world. He said that no State was able to be successful in the enactment of uniform sanitary laws and regulations if there was no central health department.

When the plague broke out in Mazatlan in 1902–03, the governments of the United States, Cuba, and those of the West Indies thought that Mexico would not be able to take the necessary steps for the control of the disease. At the time Mexico established one chief, one central office, and one treasury, which three factors combined to give most satisfactory results, to such an extent that after six months had elapsed the plague had been entirely extinguished, and no more cases of plague have appeared in the republic.

In 1903 several cases of yellow fever appeared in the port of Vera Cruz,

spread in the Gulf States, and even invaded some other States. Then the seaboard States called for intervention by the Federal government. In three months the epidemic was stamped out, and the isolation and destruction of the foci of infection were continued over a period of two years. In 1907 there were seven cases of yellow fever; this year (1908), three new foci were discovered in Laguna del Carmen, Vera Cruz, and Merida. Such results would have never been obtained without a central department of health.

Dr. Eugene Bullock (St. Joseph, Mo.): As one of the most eminent medical writers has said: "There are duties which are difficult of fulfilment pertaining to every position in life; and there are duties attached to public professional life from which no man can assume to himself the right to shrink with whatever diffidence and feeling of incapacity they may be undertaken." It is with a feeling that the paper has been too much abridged to fully accomplish its original purpose, and also with a feeling of the duty of a public servant to a deserving and misused people, that this task is undertaken.

When the masses of people read in the daily papers of the efforts being made by the antituberculosis societies to protect the public from the ravages of the white plague, they are liable to think their interests are guarded better than they really are. They read of what the societies are trying to do, and fail to think of what ought to be accomplished. A vast amount of good has been done by the efforts put forth in the last few years to curb the onward march of tuberculosis.

However diligent the medical profession may be in its researches, however carefully it may educate the people to care for their health, there will still be lacking a certain discipline without which all efforts fail.

The secretary's report to the Missouri State Association for the Control and Prevention of Tuberculosis, May 20, 1908, among other things says: "We have been working to secure a traveling tuberculosis exhibit, to be shown in a railway car all over the State. This will enable us to reach thousands of people at very small expense, with information about the disease and its prevention. An effort was made to secure funds from the State board of health for this purpose. While the board was willing, the State Auditor felt compelled to refuse to honor their warrant." Here we see a lack of funds hampering the work of the society, and thus it will ever be till the necessary funds are provided from some other source.

The only way we will ever accomplish what should be accomplished, and accomplish it as soon as it should be, is to establish a department of health. Then we would have strict discipline—the only thing that ever accomplished anything where so many people are interested. After the government had once established the bureau we would have no lack of funds, literature, or means of distribution.

Our legislative departments of government enact laws and appropriate vast sums of money to advance our commercial interests. They build war-ships to protect our commerce and defend our honor at home and abroad. They appropriate millions to improve rivers and harbors to carry water to desert wastes and establish forest reserves—all for what? The people. And yet they let the people, every man, woman, or child of which is one eighty-millionth part of this government, go without the protection of a department of health.

Has the government done anything to safeguard the health of our people? Yes. By the Department of Agriculture. Greater strides have been made against the "white plague" by the establishment of government meat inspection and pure food law since 1889, when the department was first established, than have been accomplished by the medical profession in general since the time "Old Glory" was first borne upon the breeze.

Well do I remember when the Department of Agriculture was added to the President's cabinet. How much good-natured fun was poked at the new department. How the farmers laughed at the so-called government system of book farming. Who now dares question the wisdom of those who established it?

How many of us feel that when the government stamp of inspection appears upon our meat it is safe to eat? We know that the government official has inspected every brute that has been slaughtered for food, and if tuberculosis was found, the animal was condemned as unfit for food. Then why are we not safe? Eight years' experience as surgeon for three of the largest meat-packing firms of the world brought to my every-day observance that there are thousands of people who have consumption handling the cured and uncured foods we eat. These people are working in all kinds of factories, confectioneries, bakeries, and stores. I have seen people who I knew had tuberculosis, coughing their lives away and expectorating promiscuously their deadly spittle, handling fresh and cured meats.

The wonder is that the medical profession has tolerated it so long. Our local societies, our State societies, and our national society should demand of Congress and the President a department of health.

"But," says the Humane Society, "the man who has consumption must work, for he must live." In answer to this I say that, if our government is able to protect us from a foreign foe, it is able to care for those who, after being found a menace to health, are denied the privilege of working where they will endanger others.

I do not wish to tire you with dry statistics or tedious individual cases, but will recite one instance as a warning example that came under my observation. Five years ago I attended a man who had tuberculosis in both lungs. For several months this man expectorated bloody sputum,

and I finally sent him to Arizona. After a few months' time he was greatly improved and came home, but has continued to cough and expectorate very profusely ever since. He has been working for the past four years packing dressed poultry in boxes for shipment. He is now confined to his bed, in the last stages of consumption. How many people do you suppose have been infected or may have been infected by this one case? The only remedy is a department of health. I do not think there is a sane reason why we should not have one. I think it is the duty of every physician to help get one. And I think that if the proper effort is made we will get one.

After a department of health is established, we will wonder why we did without it so long.

If two hundred thousand of our people were menaced by the guns of some foreign enemy, whose bullets are not half so deadly as the germs of tuberculosis, what would our government do? Call out the entire United States army and bring home our visiting fleet of war-ships.

Our government has persistently ignored the question and the medical profession has slept the sleep of neglect. Societies may form and resolve, meet and adjourn, till the volume of human history shall be sealed and delivered to the Omnipotent Judge, and tuberculosis will still claim its millions unless the government sees fit to act. People will continue to be infected by those who have tuberculosis handling food products as long as the people and the government will tolerate it.

How long will we discuss imaginary means of prevention and ignore real ones? How long will the people endure the present abuses?

I appeal to the American members of this Congress to use their influence to secure a department of health, with government inspection, by medical officers, of those handling food products.

VORSCHLAG ZUR AUSROTTUNG DER TUBERKULOSE.

Von Dr. Emerich Toth,
Ungarn.

1. Die Tuberkulose verbreitet sich durch Kontagion und wird entweder durch den Bazillen enthaltenden Auswurf des kranken Menschen verbreitet der gelangt infolge des Genusses von Fleisch, Milch, Sahne, Käse und Butter des an Perlsucht leidenden Rindviehs in den Organismus.

2. Die Heilung der Tuberkulose durch Medikamente ist bis heute ohne Erfolg geblieben. Der Erfolg oder die Erfolglosigkeit der Spengel'schen und anderer Heilmethoden bildet heute noch eine offene Frage der Wissenschaft und Wortstreite über diese haben keine Übereinkunft zustande gebracht.

3. Die Tuberkulose unterscheidet sich von den anderen kontagiösen und epidemisch auftretenden Krankheiten dadurch, dass sie auf der ganzen Welt überall stetig vorhanden ist und überall mehr oder weniger Opfer heischt, während die anderen kontagiösen Krankheiten nur zeitweise und in kleineren oder grösseren Gebieten vorherrschend zu sein pflegen.

4. Eine Heilung, Vorbeugung oder Ausrottung der kontagiösen Krankheiten (ausgenommen Diphtherie, Blattern, Luës, Wechselfieber) durch blosses Heilverfahren übersteigt unser Können. Es müsste daher angestrebt werden, gegen die Tuberkulose gerade so vorzugehen, wie bei der Cholera, Pest, Typhus, u. s. w., bei welchen die Art und Weise des Verfahrens schon festgesetzt ist. Der an Tuberkulose leidende Kranke müsste abgesondert werden; der von ihm berührte kontagiöse Stoff sollte desinfiziert, d. h. zu einer Verseuchung unfähig gemacht werden; schliesslich müsste man bestrebt sein, die Wohnung, Möbel, Kleidungsstücke und andere Sachen des Kranken, welche dieser zu gebrauchen pflegt, mit grösster Strenge zu desinfizieren.

5. Das an Perlsucht leidende Rindvieh müsste vernichtet werden, geradeso wie man vor einigen Jahren das an kontagiöse Lungenentzündung leidende Rindvieh vernichtet hatte.

6. Alles mögliche sollte geschehen, um die die Tuberkulose befördernden Umstände und Verhältnisse zu bessern, und um dieses zu erreichen, müsste ein besonderes Augenmerk auf die Wohnung, Bekleidung, Ernährung, Beschäftigungshygiene, die öffentliche Reinlichkeit, wie auf die weltbekannte Verheerung des Alkoholismus gerichtet werden.

7. Die Hygiene müsste, als obligater Prüfungslehrgegenstand in Volks-, Mittel- und Hochschulen, Präparandien, Seminarien, höheren Töchter-, Handels- und Gewerbeschulen, mit einem Worte überall unterrichtet werden, wie das die ausserordentliche Wichtigkeit dieses Lehrgegenstandes erfordert.

8. Die Tuberkulose sollte als Krankheit, ihre Ursache, Natur, Kontagion, Verlauf, die für diese Krankheit empfänglich machenden Umstände, die Heilbarkeit der Krankheit, die Art und Weise der Vorbeugung in volkstümlichen Vorträgen, womöglich im weiten Kreise, bekannt gemacht, die Meschheit über dieselbe aufgeklärt werden.

9. Die Tuberkulose als eine kontagiöse Krankheit müsste beständig für eine epidemische Krankheit betrachtet werden. Darum sollte man jeden Tuberkulosefall der Behörde anmelden; die Kranken müssten in Evidenz gehalten werden und jene Kranken, welche an offener Tuberkulose leiden, wenn zu ihrer Pflege keine geeignete Lokalität oder entsprechend aufgeklärtes Krankenwärterpersonal nicht vorhanden wäre, in das Epidemickrankenhaus interniert werden.

10. Die Behörden, der Staat sollte für tuberkulöse Kranke überall Ordinationslokalitäten aufstellen lassen; die unbemittelten Kranken müssten unentgeltlich behandelt und mit Arzneimitteln versehen werden. Dieserart könnte man dann erreichen, dass die an Tuberkulose leidenden unter entsprechender ärztlicher Behandlung und Kontrolle stehen würden. Die noch ambulanten, jedoch an offener Tuberkulose leidenden Kranken sollten verpflichtet werden, die Dittweiler'schen Spuckgläser zu gebrauchen.

11. Die Behandlung in Sanatorien weist bei der Heilung beginnender Tuberkulose glänzende Erfolge auf, darum sollten derartige Institute in je grösserer Anzahl errichtet werden.

12. Nachdem die Tuberkulose beständig eine epidemische Krankheit der gesamten Menschheit ist, müssten die gegen diese notwendigen Schutzmassregeln in jedem Kulturstaate ins Leben gerufen und solange in Kraft bleiben, und eingehalten werden, bis man zur Ausrottung der Tuberkulose über verlässlichere und erfolgreichere Mittel und Wege verfügt.

Suggestions for the Limitation of Tuberculosis.—(Toth.)

1. Segregation of the infectious patient and careful destruction of infected material. 2. Stringent measures for the eradication of animal tuberculosis. 3. Measures directed to dwelling houses, food supply, occupation, hygiene, cleanliness, and alcoholism. 4 Instruction in hygiene, of teachers in primary and secondary schools and in colleges, preparatory schools, seminaries, girls' high schools, business colleges, and the manual training school. 5. The people should be instructed by means of popular lectures. 6. Com-

pulsory notification of all cases of tuberculosis. 7. Free dispensaries for the indigent consumptives. 8. Walking cases should be compelled to use pocket spit-cups. 9. The erection of more sanatoriums.

Sugestiones para limitar la Tuberculosis.—(TOTH.)

1. Segregación de los pacientes infecciosos y una cuidadosa destrucción del material infectado. 2. Medidas extrictas para la eliminación de la tuberculosis en el ganado. 3. Medidas directas contra los factores predisponentes; las habitaciones, los alimentos, las ocupaciones, la higiene pública y el alcoholismo. 4. Instrucción en Higiene, la cual deberá ser incluida entre las materias del examen de maestros de escuelas primarias y secundarias y colegios, escuelas preparatorias, seminarios, colegio de mujeres, colegio de negocios, y en las escuelas politecnicas. 5. El pueblo deberá ser instruido, por medio de conferencias populares. 6. El denuncio obligatorio de todos los casos de tuberculosis. 7. Dispensarios gratis para los tisicos indigentes. 8. Casos ambulantes de tuberculosis deberán ser obligados a usar escupideras. 9. La construcción de mas sanatorios.

Recommandations pour limiter la tuberculose.—(TOTH.)

1. La ségrégation des malades infectieux; et la destruction soigneuse des matières contagieuses. 2. L'adoption de moyens rigoureux pour déraciner la tuberculose peritonéale bovine. 3. Les moyens dirigés vers l'enlèvement des agents provocateurs; soins des habitations, des aliments, des métiers, de la sanitation publique et de l'alcoolisme. 4. Enseignement de l'hygiène. Ce sujet doit être compris parmi ceux de l'examen des instituteurs dans les écoles primaires et secondaires, dans les lyceés, dans les gymnases, les séminaires, les séminaires de jeunes filles, des écoles d'affaires, et dans les polytecniques. 5. Conférences populaires sur la nature de la tuberculose. 6. Déclaration obligatoire de tous les cas de tuberculose, qu'on doit ensuite surveiller. 7. Locaux d'assistance gratuite pour les poitrinaires indigents. 8. Les cas de tuberculose ambulatoires doivent être obligés de se servir de crachoirs portables. 9. Construction de sanatoriums.

COÖPERATION BETWEEN THE STATE AND PRIVATE CORPORATIONS IN THE CRUSADE AGAINST TUBERCULOSIS AS EXEMPLIFIED AT THE WHITE HAVEN SANATORIUM.

By Dr. William B. Stanton,
Philadelphia.

The White Haven Sanatorium was opened in 1901 by "The Free Hospital for Poor Consumptives and White Haven Sanatorium Association," an association organized in 1897. This association has for its program, first, the establishment of a sanatorium for early cases; second, the establishment of a sanatorium for advanced curable cases; third, the establishment of a hospital for dying cases; fourth, the establishment of a convalescent farm for cases which have had the disease arrested. It began its work with caring for dying cases in existing hospitals. Between the date of its organization, February 21, 1895, and 1903, when the maintenance of dying cases was temporarily suspended, the society maintained 1062 patients at from $5 to $7 a week in the following institutions: St. Agnes Hospital, St. Mary's Hospital, the University Hospital, the German Hospital, and the Rush Hospital of Philadelphia, Bideawhile Sanatorium and Sunnyrest Sanatorium in Pennsylvania, and Gabrielle Sanatorium in the Adirondacks. From the opening of White Haven Sanatorium in August, 1901, to March 1, 1908, the society has maintained 2749 patients at White Haven Sanatorium. In March, 1906, the Society, to facilitate its work, opened Department No. 2, for advanced curable cases. In April, 1908, it opened a department for children. The White Haven Sanatorium is two-thirds completed. It has two hundred and eleven beds.

Financial Support.—This comes from private charity, appropriations of the State of Pennsylvania, and board of pay patients. During the first six years after organization the members of the society collected $33,536.45 from private individuals. In 1901, when the White Haven Sanatorium was opened, the State made its first appropriation of $50,000, of which $40,000 was for equipment at White Haven and $10,000 for the maintenance of dying cases. This was followed by appropriations in 1903 of $115,000 ($65,000

for buildings and equipment and $50,000 for maintenance for two years); in 1905 of $70,000 ($60,000 for maintenance for two years and $10,000 for equipment and repairs); and in 1907, $70,000 for maintenance for two years. The society collected, between 1901 and 1907 inclusive, $135,460.85. As the average individual contribution was small, the aggregate represented a large number of contributors, and in consequence a large number of people interested. In the six years preceding the opening of White Haven a few cases had been found where the relatives or friends wished to contribute something to the support of the patient. The money received in this way before 1901 amounted to $379.81. In 1901, $339.32 was paid for board of patients, and in 1902, $1,034.96. In 1903 and 1904 all the beds at White Haven were made free. This resulted in a heavy debt, and in April, 1905, a portion of the beds was placed upon a partial pay basis and 100 beds maintained for free patients. The amount paid during this year (1905) by patients was $16,223.83. In 1906, $21,474.43 was paid by patients, and 1907, $32,676.60. The sources from which the money was obtained are shown in the accompanying tables.

Educational Value of Combined State Aid and Private Charity.—To appreciate this fully the method by which charities are aided by the commonwealth in Pennsylvania must be understood. The managers of the institution seeking aid must first appear before the State Committee on Charities and convince them of the need of this particular charity. When this is done, the matter is reported favorably to the Committee on Appropriations, who in turn must be convinced of the necessity of the work. A subcommittee is then appointed to visit the site of the institution, to pass judgment upon the equipment and management of the place, and to decide as to the amount that can be economically expended. The bill, with the amount decided upon by the committee, is then voted upon by the two Houses, and if their approval is given, it finally comes to the governor. He in turn must be convinced not only as to the need of the charity, but as to the ability of the managers of the institution to properly expend the money. Securing an appropriation thus requires the education of all the members of the Legislature. The men thus influenced are of the type that are hardest to reach, but when once favorably impressed can do much to advance the cause. Mr. Henry Phipps became interested in tuberculosis through the advice of a member of the State Board of Charities.

Each year the annual report is mailed to every member of the Legislature, to subscribers, and to thousands of people from whom funds are solicited. Newspapers comment on the report, partly on account of the work which it reports and partly on account of the large number of people interested. Public education is the result. This education is made more effective by the coöperation between the State and private charities.

AMOUNT OF MONEY RECEIVED AND SOURCES FROM WHICH IT HAS BEEN OBTAINED.

	Private Charity.	Patients' Board.	Loans not Paid.	State Appropriation.		Total Net Receipts.	Balance at End of Year.	Loans Made.	Loans Paid.
				For Maintenance.	For Buildings.				
1895	$3,853.54	..	..	..	..	$3,853.54	$1,941.25	..	..
1896	2,634.68	$65.00	..	..	..	2,699.68	2,487.45	..	..
1897	1,814.52	35.00	..	..	..	1,849.52	989.78	..	..
1898	5,804.06	54.67	..	..	..	5,858.73	2,051.61	..	..
1899	8,910.31	64.00	..	..	..	8,974.31	2,581.17	..	..
1900	10,519.34	161.14	..	..	..	10,680.48	3,213.38	..	..
1901	14,408.60	339.32	..	$3,750.00	..	18,497.92	665.39	..	..
1902	29,722.17	1,034.96	..	5,000.00	$34,335.22	70,092.35	681.95	..	..
1903	19,766.47	..	..	20,000.00	29,065.05	68,831.52	778.75	$11,450.00	$11,250.00
1904	20,077.64	..	..	25,000.00	41,599.73	86,677.37	3,426.69	29,930.57	9,630.57
1905	19,652.47	16,223.83	..	26,309.78	8,151.68	70,337.76	601.31	..	18,100.00
1906	17,296.36	21,474.43	..	32,440.22	1,848.33	73,059.34	764.03	26,500.00	27,500.00
1907	14,537.14	32,676.60	..	30,787.17	..	78,000.91	668.04	22,550.00	20,650.00
Loans (not paid)	..	..	$3,300.00	..	..	3,300.00	..	..	..
	$168,997.30	$72,128.95	$3,300.00	$143,287.17	$115,000.01	$502,713.43	..	$90,430.57	$87,130.57

Balance on hand.

In hands of Superintendent at White Haven Sanatorium	$600.00
In hands of Treasurer	68.04
Total	$668.04

The Plant at White Haven Sanatorium.—As far as completed this consists of 222 acres of ground, of which seventy acres are under cultivation. The buildings are as follows: The cottage for the superintendent. The administration building, not yet completed. This contains the dining hall, kitchen, and store-rooms on the first floor, with the laundry and laboratories in the basement and sleeping-rooms for the employees on the second floor. Connected with the main building by covered passageways are two infirmaries, one for men and one for women, each with a capacity of 15 beds. All patients are kept here on admission. In Department No. 1, for early cases who are on exercise, there are three brick cottages, each with a capacity of 16 beds; a large frame pavilion with a capacity of 35 beds; and eight frame shacks each with a capacity of 8 beds. At present one of the cottages is used temporarily for administration purposes and the housing of the resident physicians. An additional cottage is in course of erection.

In Department No. 2, for more advanced cases, who while capable of improvement cannot be put on much exercise, there are two infirmary shacks, one for men and one for women, each with a capacity of 21 beds. In the children's department, which is not yet completed, there are seven beds for girls. The present bed capacity for all departments is 211, of which 119 are for males and 92 for females.

In addition to the above buildings, there is a power-house, with its equipment of boilers, engines, and dynamos for supplying heat, power, and light to all buildings. This is managed as the department of heat, light, and power. There is a good-sized carpenter shop fitted up with the necessary tools and a surveyor's quadrant for the department of construction and repairs. There are five large buildings for chickens, of which the sanatorium now possesses 2500, and a full equipment of incubators and brooders. This is managed in conjunction with the farm, which comprises under its equipment a frame house for employees; a barn and six horses with a complete outfit of harness, wagons, and farm tools; and a greenhouse. There is a water plant, including wells, pumps, tanks, and reservoirs, and a sewage system.

Management of the White Haven Sanatorium.—Since the patients for the sanatorium come from all parts of the State, and since the members of the Board of Managers reside in Philadelphia, a central office is maintained at 204 South Seventh Street, Philadelphia. This office is under the management of an official secretary. From here all bills are paid and business transacted. The Board of Managers meets once a month, and once a year there is a general meeting of the members of the association. Applicants for admission on applying to the office are referred to the nearest examiner. The number of examiners at present is one hundred and forty-two and they are located throughout the State. The Philadelphia office has a duplicate list of beds and patients, so there is no delay in filling vacant beds.

ADMINISTRATION AT WHITE HAVEN.—The general control of the White Haven Sanatorium is under the direction of a superintendent—a medical man. Under him are the heads of the various departments. These departments are: Construction and repair; heat, light, and power; farm and poultry; housekeeping, including the laundry and kitchen; medical care and nursing. The medical care of the patients is looked after by the resident physicians under the guidance of the medical staff. There are four resident physicians now on duty. The medical staff consists of fourteen visiting physicians and a consulting physician. Each member of the staff visits the sanatorium once every two weeks, so that some member of the visiting staff is at the sanatorium nearly every day. Patients can be discharged by the visiting physicians only when the disease is arrested. If they are to be discharged before this stage is reached or because they are unsuitable, they must first be referred to the consulting physician. The nursing is done by the pupil nurses of the training school. This school is under the charge of the head nurse, who is a graduate of a general training school. The pupil nurses themselves are recruited from patients treated at the sanatorium who desire to take up nursing as an occupation after their own disease has become arrested. As a rule, such patients make good nurses. They have the sympathy which comes from a personal experience in taking the cure, and they are more hopeful than the nurse who has had only general training. Such nurses are sure that tuberculosis is curable because they themselves have been cured. They stand the work well because they are constantly living a correct life. So far as known, this is the first sanatorium to establish a training school of this type. The Henry Phipps Institute was the first to establish a training school for cured cases of tuberculosis, securing their pupil nurses from our White Haven patients. The White Haven training school has a capacity of eighteen nurses, two of the positions being filled by males. The school has now been in operation for one year and works out satisfactorily. The course is two years.

THE PATIENTS AT THE WHITE HAVEN SANATORIUM.—In order to properly appreciate the results obtained at any tuberculosis sanatorium the character of the patients treated must be fully understood. The ultimate results will depend upon the physical condition, that is, the amount of tissue destroyed, and the complications; upon the financial standing, which will influence the after-care, as in housing, food, and general surroundings; and upon the mental caliber, which determines the correctness with which the patient will follow the plan of life taught him at the sanatorium.

Physical Condition; Classification of Cases.—The White Haven Sanatorium is intended for favorable cases. The decision as to the prognosis is not made from the degree of involvement alone. A large proportion of our patients are cavity cases. For the purpose of comparison our cases have

been classified according to the method adopted by the National Association, with the following result: Incipient, 24.04 per cent.; moderately advanced, 40.39 per cent.; far advanced, 35.56 per cent. These figures are based upon 1780 cases.

Financial Status.—The prime requisite for admission to White Haven is the inability to pay for treatment at some private institution. A careful inquiry into the finances of each patient forms a part of the admission examination. Consequently the vast majority of the patients are either working people or children of working people. The sanatorium has at present 100 free beds; 69 beds in No. 1 Department at $7 per week; 42 beds in No. 2 Department at $9 per week. Applications are made for each list and patients are admitted in order of application.

Mental Status of Patients.—Many of the patients come from the lower and middle walks of life and have only an ordinary degree of intelligence. Many are Russian Jews, Polanders, Italians, and other recent emigrants, and are unfamiliar with English. These do not understand directions well, and when they do go out, it is difficult for them to secure any but the hardest kind of work. A relatively small number of negroes are treated each year.

Method of Treatment.—Treatment at the White Haven Sanatorium is based upon feeding, rest, and fresh air. An important feature is a graded system of useful, purposeful work when the patient's condition is sufficiently improved to permit of exercise. It was recognized at the time of opening the sanatorium that it was necessary to prepare patients to resume work on their return home. A large part of the work of the sanatorium has always been done by the patients. As White Haven was the pioneer in this plan, there was no precedent to follow, and the present system gradually evolved itself. After two years of trial without classification both the work and the patients were classified. The routine plan is one month's rest in the infirmary. Exercise is now begun if the condition is satisfactory. The usual routine is one hour's work daily.

Classification of the Work Done by the Patients at the White Haven Sanatorium.

Class A.—The work under this division is light, and is suitable for patients who are on from one to four hours' work. It can be done by even the most delicate. In this class are:

Making pasteboard sputum-cups.
Mending linen by hand.
Preparing vegetables (peeling potatoes, apples, etc., shelling peas and beans, etc.).
Polishing brass and silver.
Picking up papers on lawn.

Class B.—The work in this class requires a moderate degree of strength and is suitable for moderately strong patients who are able to do from four to six hours' work a day.

Carrying dinners to cottages (distance of about 300 feet).
Sweeping porches and kiosks.
Clerical work in office.
Wiping off window-sills, etc.
Helping serve lunches and washing lunch dishes.
Cleaning beds.
Cleaning electric light globes.
Attending to superintendent's cottage.
Gathering fruit and vegetables.
Making beds.
Mending linen, machine work.

Class C.—In this division are occupations which require strength as well as endurance. They are given to patients who are about to be discharged as disease arrested. Patients under this class are able to work from six to eight hours a day.

Assisting driver on wagon.
Assisting receiving clerk with milk and freight.
Assisting on chicken farm.
Mowing and raking lawn.
Chopping kindling wood.
Carrying blankets and dress-suit cases from fumigating room to laboratory.
Running steam pump.
Carrying dinners to pavilion (distance of about 100 feet).
Cleaning windows.
Mopping cottage rooms.

To be Done by Patients without Tubercle Bacilli in Sputum.—Stemming berries; preparing fruit for the table; filling salt and pepper shakers, sugar bowls, vinegar cruets, etc.

This method has been in use for seven years, and is by far the most satisfactory so far advised. It is possible to control the exercise within very narrow limits. Each piece of work has been done so many times by so many different patients that the amount of energy necessary to its completion is definitely known. Besides, each patient realizes the value of what is accomplished, and as his working capacity increases he knows that he is improving. Doing work under constant supervision and with regular records of weight, temperature, and pulse teaches the patient how to recognize when he is failing in strength and how to guard himself. There is absolutely no danger of overexercise in work of this sort, such as so often occurs in patients who get their exercise in walks and games.

Results at the White Haven Sanatorium.—The total number of patients treated since the opening in August, 1901, up to February 29, 1908, is 2749. Statistics were available upon 1780 cases.

CLASSIFICATION ACCORDING TO THE PLAN ADOPTED BY THE NATIONAL ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS. CASES WHICH REMAINED IN THE SANATORIUM LONGER THAN ONE WEEK.

First Stage. Incipient (favorable)	428 (24.04%).	Males, 277;	females, 151
Second Stage. Moderately advanced	719 (40.39%).	" 439;	" 280
Third Stage. Far advanced	633 (35.57%).	" 397;	" 236
Total	1780		

LENGTH OF STAY OF PATIENTS WHO REMAINED LONGER THAN ONE WEEK.

Remaining more than three months	983 (55.22%).	Males, 598;	females, 385
Remaining more than one month and less than three months,	529 (29.72%).	" 349;	" 180
Remaining more than one week and less than one month	268 (15.06%).	" 166;	" 102

It is extremely difficult to get patients to stay after cessation of symptoms and marked increase in weight, and yet where the patient must earn his living by manual labor, it is of the greatest importance to get him accustomed to actual work before allowing him to return to home surroundings.

A detailed report of results on discharge is here given only in those cases which remained longer than three months. While a shorter period is productive of much benefit, and the habits learned may lead to a permanent cure, the credit of all the improvement does not belong to the sanatorium. Many letters have been received from patients who remained but a short time, and who have since gone on to complete cure, but they were exceptionally intelligent individuals.

CLASSIFICATION OF MALE PATIENTS WHO REMAINED LONGER THAN THREE MONTHS.

Incipient (favorable)	146 (24.4%)
Moderately advanced	366 (61.2%)
Far advanced	86 (14.4%)
Total	598 (100 %)

Up to the time when the National Association agreed upon a classification for discharged patients there was no generally accepted standard. The standard by which the White Haven patients were gaged is much more exacting than generally employed. Thus, "disease arrested" requires cessation of the general signs of disease, and that the patient has worked eight hours per day for one month without elevation of the temperature or pulse-rate. "Very much improved" requires more than four hours' work per day, together with marked improvement in the general condition, and, of course, absence of temperature and increased pulse-rate. "Much improved" requires between one and three hours' work per day, together with improvement in the physical condition along with normal temperature. "Improved" requires gain in weight with lessening of the temperature and pulse-rate.

RESULTS ON DISCHARGE FOR THE DIFFERENT STAGES (MALES).

Stage 1.—Incipient (Favorable).

Disease arrested	97 (66.44%).	Average gain in weight,	19.03 lbs.
Very much improved	14 (9.59%).	" " " "	27.25 "
Much improved	15 (10.27%).	" " " "	17.75 "
Improved	19 (13.01%).	" " " "	12.03 "
Not improved	1 (0.68%).	" " " "	1.75 "
Total	146		

Stage 2.—Moderately Advanced.

Disease arrested	149 (40.72%).	Average gain in weight,	20.00 lbs.
Very much improved	29 (7.92%).	" " " "	19.00 "
Much improved	80 (21.86%).	" " " "	17.50 "
Improved	89 (24.32%).	" " " "	12.90 "
Not improved	18 (4.91%).	" loss " "	4.64 "
Died	1 (0.27%).	" gain " "	18.00 "
	— (100 %).		
Total	366		

Stage 3.—Far Advanced.

Disease arrested	23 (26.75%).	Average gain in weight,	17.63 lbs.
Very much improved	4 (4.65%).	" " " "	23.00 "
Much improved	22 (25.58%).	" " " "	11.15 "
Improved	34 (39.54%).	" " " "	11.75 "
Not improved	2 (2.32%).	" " " "	0.50 "
Died	1 (1.16%).	" " " "	0.0
	— (100 %).		
Total	86		

CLASSIFICATION OF FEMALE PATIENTS WHO REMAINED LONGER THAN THREE MONTHS.

Stage 1.	Incipient (favorable)	86	(22.34%)
Stage 2.	Moderately advanced	250	(64.93%)
Stage 3.	Far advanced	49	(12.73%)
		—	(100 %)
Total		385	

RESULTS ON DISCHARGE FOR THE DIFFERENT STAGES (FEMALES).

Stage 1.—Incipient (Favorable).

Disease arrested	47 (54.65%).	Average gain in weight,	19.15 lbs.
Very much improved	9 (10.46%).	" " " "	24.3 "
Much improved	14 (16.28%).	" " " "	19.87 "
Improved	14 (16.28%).	" " " "	11.27 "
Not improved	2 (2.33%).	" " " "	5.63 "
	— (100 %).		
Total	86		

Stage 2.—Moderately Advanced.

Disease arrested	110 (44.0 %).	Average gain in weight,	lbs.
Very much improved	24 (9.6 %).	" " " "	21.63 "
Much improved	54 (21.6 %).	" " " "	24.95 "
Improved	51 (20.4 %).	" " " "	21.41 "
Not improved	9 (3.6 %).	" " " "	14.00 "
Died	2 (0.8 %).	" " " "	3.90 "
	— (100 %).	" " " "	14.12 "
Total	250		

STAGE 3.—FAR ADVANCED.

Disease arrested	19 (38.90%).	Average gain in weight,	20.61 lbs.
Much improved	14 (28.50%).	" " " "	14.37 "
Improved	12 (24.44%).	" " " "	15.12 "
Not improved	4 (88.16%).	" " " "	2.81 "
	— (100 %).	" " " "	
Total	49		

ULTIMATE RESULTS.—The true test of the work done by any sanatorium is the length of time that the patient remains well after the course of treatment. This does not necessarily mean that the patient goes back to the same occupation, as this is often impossible. It must be remembered that tuberculosis always destroys tissue, and when the destruction of tissue is very great, the patient's working power is impaired, even though complete arrest of the disease is obtained. Under these circumstances the patient may be unable to perform certain heavy kinds of work. In general, it may be said that retention of health after leaving a sanatorium is much more constant in those whose occupations are of the lighter kind. The good condition of the nurses at the Phipps Institute is evidence of this fact.

FIRST STAGE (MALES AND FEMALES).

Number of cases heard from, discharged "disease arrested"..... 41
Well, 48.78%; living, but not well, 48.78%; dead, 2.44%.
Number of cases heard from discharged "much improved"..... 24
Well, 16.76%; living, but not well, 29.17%; dead, 54.16%.
Number of cases heard from discharged "improved"..... 15
Well, 33.33%; living, but not well, 20.00%; dead, 46.67%.

SECOND STAGE.

Number of cases heard from, discharged "disease arrested"..... 87
Well, 39.08%; living, but not well, 42.53%; dead, 18.39%.
Number of cases heard from, discharged "much improved"..... 76
Well, 25%; living, but not well, 28.95%; dead, 46.05%.
Number of cases heard from, discharged "improved" 49
Well, 8.24%; living, but not well, 22.30%; dead, 69.46%.

THIRD STAGE.

Number of cases heard from, discharged "disease arrested"..... 12
Well, 41.67%; living, but not well, 41.67%; dead, 16.66%.
Number of cases heard from, discharged "much improved"..... 8
Well, 25%; living, but not well, 37.5%; dead, 37.5%.
Number of cases heard from, discharged "improved"..... 9
Well, 11.11%; living, but not well, 22.22%; dead, 66.66%.

ALL STAGES.

Number of cases heard from, discharged "disease arrested"..... 140
Well, 42.14%; living, but not well, 44.28%; dead, 13.57%.
Number of cases heard from, discharged "much improved"..... 108
Well, 23.14%; living, but not well, 28.7%; dead, 48.14%.
Number of cases heard from, discharged "improved"..... 73
Well, 13.69%; living, but not well, 21.9%; dead, 64.38%.

FEMALE PATIENTS REMAINING OVER THREE MONTHS AND DISCHARGED FROM THE WHITE HAVEN SANATORIUM FROM AUGUST, 1901, TO FEBRUARY 28, 1907 INCLUSIVE.

	Result on Discharge.	Total Number of Cases.	Number of Cases Heard from.	Ultimate Result.	Number of Years Heard from after Discharge.						No Record of Date.
					1	2	3	4	5	6	
Incipient: Number of cases 86; Number of cases heard from 29	Disease arrested	47	13	Well 6	1	1	1	1	1	1	0
				Living 7	6	0	1	0	0	0	0
				Dead 0	0	0	0	0	0	0	0
	Much improved	23	7	Well 1	0	0	1	0	0	0	0
				Living 5	2	1	1	1	0	0	0
				Dead 1	0	1	0	0	0	0	0
	Improved	14	9	Well 3	0	1	1	0	0	1	0
				Living 2	1	0	1	0	0	0	0
				Dead 4	0	3	0	0	0	0	1
	Not improved	2	0	Well 0	0	0	0	0	0	0	0
				Living 0	0	0	0	0	0	0	0
				Dead 0	0	0	0	0	0	0	0
	Died	0	..	..	..	..	..	..	..	..	..
Moderately advanced: Number of cases 250; Number of cases heard from 85	Disease arrested	110	36	Well 21	6	4	5	3	3	0	0
				Living 12	11	1	0	0	0	0	0
				Dead 3	1	2	0	0	0	0	0
	Much improved	78	29	Well 10	1	2	3	1	3	0	0
				Living 7	3	2	2	0	0	0	0
				Dead 12	4	4	1	0	0	0	3
	Improved	51	17	Well 2	0	1	0	0	1	0	0
				Living 5	2	2	0	0	1	0	0
				Dead 10	5	0	1	0	0	0	4
	Not improved	9	3	Well 0	0	0	0	0	0	0	0
				Living 0	0	0	0	0	0	0	0
				Dead 3	0	0	0	0	0	0	3
	Died	2	0	..	..	..	..	..	..	..	..

Far advanced: Number of cases 49; Number of cases heard from 10	Disease arrested	19	6	Well	2	0	0	0	1	0	1	0
				Living	3	3	0	0	0	0	0	0
				Dead	1	1	0	0	0	0	0	0
	Much improved	14	0	Well	0	0	0	0	0	0	0	0
				Living	0	0	0	0	0	0	0	0
				Dead	0	0	0	0	0	0	0	0
	Improved	12	2	Well	0	0	0	0	0	0	0	0
				Living	0	0	0	0	0	0	0	0
				Dead	2	1	1	0	0	0	0	0
	Not improved	4	2	Well	0	0	0	0	0	0	0	0
				Living	0	0	0	0	0	0	0	0
				Dead	2	1	0	0	0	0	0	1
	Died	0	..	..		..	..	..	..	..	..	..

MALE PATIENTS REMAINING OVER THREE MONTHS AND DISCHARGED FROM THE WHITE HAVEN SANATORIUM FROM AUGUST, 1901, TO FEBRUARY 28, 1907, INCLUSIVE.

	Result on Discharge.	Total Number of Cases.	Number of Cases Heard from.	Ultimate Result.	Number of Years Heard from after Discharge.						No Record of Date.
					1	2	3	4	5	6	
Incipient: Number of cases 146; Number of cases heard from 51	Disease arrested	97	28	Well 14	2	3	4	2	2	1	0
				Living 13	7	1	3	2	0	0	0
				Dead 1	0	0	0	0	1	0	0
	Much improved	29	17	Well 3	0	1	1	0	1	0	0
				Living 2	1	0	1	0	0	0	0
				Dead 12	1	4	0	0	0	0	7
	Improved	19	6	Well 2	0	0	0	2	0	0	0
				Living 1	0	1	0	0	0	0	0
				Dead 3	0	1	0	0	0	0	2
	Not improved	1	0	Well 0	0	0	0	0	0	0	0
				Living 0	0	0	0	0	0	0	0
				Dead 0	0	0	0	0	0	0	0
	Died	0	0	..	..	..	..	..	..	..	..

MALE PATIENTS REMAINING OVER THREE MONTHS AND DISCHARGED FROM THE WHITE HAVEN SANATORIUM FROM AUGUST, 1901, TO FEBRUARY 28, 1907, INCLUSIVE.—(*Continued.*)

	Result on Discharge.	Total Number of Cases.	Number of Cases Heard from.	Ultimate Result.	Number of Years Heard from after Discharge.						No Record of Date.
					1	2	3	4	5	6	
Moderately advanced: Number of cases....366; Number of cases heard from .134	Disease arrested.....	149	51	Well.....13	2	5	2	1	2	1	0
				Living.....25	8	9	5	2	1	0	0
				Dead.....13	2	5	1	1	0	1	3
	Much improved.....	109	47	Well 9	4	3	0	1	1	0	0
				Living.....15	4	5	4	2	1	0	0
				Dead 23	9	3	4	0	0	0	7
	Improved.....	89	32	Well..... 2	0	2	0	0	0	0	0
				Living..... 6	2	3	0	1	0	0	0
				Dead.....24	9	2	1	0	0	0	12
	Not improved.....	18	4	Well..... 1	1	0	0	0	0	0	0
				Living..... 0	0	0	0	0	0	0	0
				Dead..... 3	1	1	0	0	0	0	1
	Died.....	1	0	..	..	..	..	..	..	..	..
Far advanced: Number of cases..... 86; Number of cases heard from . 23	Disease arrested.....	23	6	Well..... 3	0	1	1	0	0	1	0
				Living..... 2	1	0	1	0	0	0	0
				Dead..... 1	0	0	0	0	0	0	1
	Much improved	26	8	Well..... 2	0	1	1	0	0	0	0
				Living..... 3	2	0	0	1	0	0	0
				Dead..... 3	0	2	1	0	0	0	0
	Improved.....	34	7	Well..... 1	1	0	0	0	0	0	0
				Living..... 2	1	0	1	0	0	0	0
				Dead..... 4	1	1	0	0	0	0	2
	Not improved.....	2	2	Well..... 0	0	0	0	0	0	0	0
				Living..... 0	0	0	0	0	0	0	0
				Dead..... 2	1	0	0	0	0	0	1
	Died.....	1	0	..	..	..	..	..	..	..	..

Cooperación entre el Estado y las Corporaciones Privadas.—(STANTON.)

Se presenta una comunicacion en cuanto al objeto de la institucion y los medios de soporte de esta, con atencion especial al valor educativo de la caridad privada cuando esta va apoyada por el Estado.

Una descripcion del plantel, el manejo, se dan los detalles de la administracion del Sanatorio de White Haven.

Los pacientes tratados en el sanatorio son conciderados desde un punto de vista de sus condiciones fisicas, estado pecuniario y mental. En la descripcion del tratamiento, se da especial atencion en cuanto al trabajo apropiado y el grado de este mientras este esta en el sanatorio. Se da una descripcion de las varias ocupaciones, la cantidad de trabajo es gradualmente aumentado de una à ocho horas diarias.

Se da en detaile los resultados del tratamiento para los varones y para las mujeres; los pacientes son agrupados de acuerdo con el estado de la enfermedad.

Se presentan los cuadros de los ultimos resultados en un cierto numero de les casos que se han dado de baja en la institucion. De 140 casos en 1907, que se les dio de baja la enfermedad detenida, 42.14% viven en buena salud, 44.28% viven, pero no gozan de buena salud y 13.57% han fallecido. Esto representa los resultados obtenidos de los casos en todos los estados de la enfermedad.

Coopération de l'Etat et des Corporations privées dans la croisade contre la tuberculose dont le Sanatarium de White Haven nous fournit un exemple.—(STANTON.)

Un rapport du but de l'Institution et des moyens de subsistance est donné en vue de montrer plus spécialement la valeur éducative de la charité privée quand elle est combinée avec l'assistance de l'Etat.

Une description générale de l'établissement, l'organisation, l'administration du sanatorium de White Haven est donnée en détail.

Les malades traités dans le sanatorium, sont considerés au point de vue de leur condition physique et de leur état financier et mental.

Dans la description du traitement suivi, on s'est plus particulièrement appuyé sur l'importance d'un travail choisi et gradué pour les malades pendant leur séjour dans le Sanatorium. Une classification des diverses occupations est donnée, la quantité de travail étant graduellement augmentée de une à huit heures par jour.

Les résultats du traitement des hommes et des femmes sont donnés en détail, les malades étant groupés selon le degré de la maladie.

Des tableaux sont donnés indiquant le dernier résultat d'un certain nombre de cas qui avaient été renvoyés de l'Institution. Sur les 140 cas dont on avait reçu des nouvelles, en 1907, et qui avaient été renvoyés comme "maladie arrêtée," 42.14% étaient vivants et se portaient bien, 44.28%

vivaient mais ne se portaient pas bien; et 13.57% étaient morts. Ces chiffres représentent les résultats obtenus dans des cas à tous les dégrés de la maladie.

Kooperation zwischen Staat- und Privat-Untersuchungen in der Bekämpfung der Tuberkulose, wie veranschaulicht im White Haven Sanatorium.—(STANTON.)

Bericht über den Zweck der Anstalt und deren Erhaltungsweise, mit spezieller Rücksicht auf den Unterrichtswerth der privaten Wohlthätigkeit, wenn mit staatlicher Beihilfe verbunden.

Folgt eine allgemeine detailirte Beschreibung der Anstalt und Administration des White Haven Sanatoriums.

Die Patienten des Sanatoriums sind mit Rücksicht auf ihren physikalischen Zustand, sowie auf Grund ihrer finanziellen und mentalen Verhältnisse gruppirt. In der Schilderung der Behandlungsweise wird mit spezieller Betonung auf die Wichtigkeit des Umstandes hingewiesen, dass die Patienten im Sanatorium angemessene fallweise geregelte Arbeiten verrichten. Hier schliesst sich eine Klassification der verschiedenen Beschäftigungen an; die Arbeitszeit wird graduell von einer Stunde auf achtim Tage erhöht.

Resultate der Behandlung bei Männern und Frauen sind in Detail angeführt; die Gruppirung der Patienten geschah je nach dem Stadium des Leidens.

Tabellen erhellen die Endergebnisse in einer Anzahl von Fällen, die aus der Anstalt entlassen wurden. Von 140 Fällen, mit der Bemerkung "Prozess stationär" entlassen und im Jahre 1907 wieder berichtet, waren 42.14% am Leben und wohlauf, 44.28% am Leben, doch leidend, und 13.58% gestorben. In der Serie sind Fälle jeden Grades vertreten.

DISCUSSION.

EDWARD F. GOLTRA (St. Louis): I have been requested by General Wyman, your Chairman, to state as a business man or man of affairs the impressions gathered by me during the past two years as president of the St. Louis Society. I am compelled to speak extemporaneously, which I regret, owing to the vast importance of this subject. Let me say, in the first place, that I greatly esteem the honor conferred upon me by General Wyman, in asking me, a business man, and therefore a layman, to address an audience composed principally of physicians. But the time has come when the men of affairs of this country must coöperate with the physicians in their noble, philanthropic, and unselfish efforts to protect all against the greatest cause of disease and death. I honor you, gentlemen, for the unselfish and spontaneous action which you exhibit here in furthering a project which can only have as a result the reduction of your income and a limitation upon your practice. In order to carry on a cam-

paign successfully in any new field of effort, education on the subject is absolutely essential, and for the past two years I have been under the tutelage of able physicians on the subject of tuberculosis. The exhibit displayed in this building is certainly a wonderful and graphic analysis of the subject, and it seems to me that only the greatest good could come from a permanent tuberculosis exhibit of this nature in Washington and in New York, where those interested could come and study the same. It has been the experience of the local society in St. Louis that the business man has been the hardest to get to take interest in the work, and still, of all the people, he is the most important to reach, and his coöperation it is most important to secure. Of all public undertakings I can truthfully say I know of none at present so important to humanity at large as the work now being undertaken by you gentlemen, and as a business man it seems to me the time has come to get results. Great work has been done and is being done along the line of study and research, and we must keep it up, but from now on let us take up the legislation side of the proposition more zealously than we have heretofore. We Americans are prone to make laws. We have many laws for the regulation of business, but we do not possess sufficiently stringent laws for the protection of the public health.

In many cities the health authorities have power to segregate all cases of contagious disease with the exception of consumption, notwithstanding the fact that consumption causes several times as many deaths as all other contagious and infectious diseases. I am told that consumption is spread by the consumptive, animal and human. In the case of the former, the problem is comparatively easy; with the latter, the problem is very hard. In the case of the latter, certain it is that we must first make provision to take care of him if he cannot properly care for himself. We must cure him if we can, but we must always take care of him. A great deal is being said about compulsory segregation of consumptives, and you doctors are compelled to report cases, and are fined if you do not report them. That is good as far as it goes; but having located a case, it is only the first step; it should then be the duty of the proper authorities to exercise proper supervision over such cases. I am prepared to state that in my judgment the time has now arrived when municipalities, small as well as large, should place on their statute-books laws giving to the local authorities power to segregate such cases. I would recommend, first, the care of the consumptive; and, second, the control of consumption. By explaining to the business man what a necessary thing the fight against the "great white plague" is, you will get their coöperation, for you are all influential in your respective communities, and you can, more than any others, interest the men of affairs in this fight. Persuade them, and the necessary legislation will be forthcoming.

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

SEVENTH SESSION.

Thursday afternoon, October 2, 1908.

TUBERCULOSIS IN THE SCHOOLS. FACTORY INSPECTION. HOUSE VENTILATION. RAILWAY SANITATION.

Section VI was called to order by the President, Surgeon-General Walter Wyman, on Thursday afternoon, October 2d, at half-past two o'clock.

His Excellency, Dr. Simon Th. Unterberger, Privy Councilor and Honorary Physician to His Majesty the Czar of Russia, presented to the Section a copy of the Russian laws on tuberculosis. Special laws in regard to tuberculosis do not exist in Russia, only laws and regulations which relate in general to infectious diseases.

These laws are as follows: *Codex der medicinalpolizeilichen Bestimungen, Capitol I, Abtheilung III.*

740. The owner or renter of a house or the renter of a house belonging to the crown, the owner of a hotel or any other institution where travelers stop, is required to make immediate report to the local police as soon as he learns that any one afflicted with spotted fever or any other infectious diseases is in the house or institution. In the same manner every person, during an epidemic, is required to give, to the landlord or police, a notice of every case occurring in his house.

741. All physicians, contract physicians as well as those in private practice, in all divisions of the government, are required, independently of the periodical reports which they must submit to the proper medical authorities, to give notice to the local medical authority of every case which, at any time, may come either under their charge or to their knowledge of epidemic infections and contagious diseases: spotted fever, smallpox, measles, scarlet fever, etc.

This year the Ministry of the Interior issued the following order in regard to tuberculosis. In "Journal des Medicinal-Raths," under date of April 1st, and in the communication of the Ministry of the Interior (under date of May 17th) it was declared, in reference to sections 740 and 741, that tuberculosis belongs to the infectious diseases, and that all the regulations in regard to infectious disease hold good also for tuberculosis. These measures can only be executed to the extent determined by the assistants, and the means which are at hand for the purpose. Therefore, it is recommended, only to the authorities of villages and cities, to carry out the compulsory notification of every case of tuberculosis, and the necessary sanitary measures against its spread.

The registration of tuberculosis of the lungs according to its stages will be carried out in accordance with the plan which was determined upon at the last conference in Vienna.

In the army (under date of March 8, 1905) and in the navy (order of November 20, 1906) all soldiers and sailors who are discharged from hospitals with sputum containing bacilli are sent directly to their homes, and, therefore, do not enter the barracks again.

MEDICAL FACTORY INSPECTION.

By Dr. G. M. Price,
New York.

Medical factory inspection is a legitimate exercise of the police power of the State, because it would be a most powerful factor in the modern struggle against tuberculosis, and in the protection of the life and health of a great part of mankind.

By the term "medical factory inspection" I understand a thorough supervision of industrial production by properly qualified members of the medical fraternity. It is over two hundred years since Ramazini called the attention of the world to the risks and dangers to which many workers in many trades are exposed, and, since then, it had been amply proved that the morbidity and mortality of the working class are much above the average, and also that many, if not most, of the diseases and dangers of occupations are wholly unnecessary and preventable.

The *laisser-faire* policy of the early factory period, during which most of the abuses of women and child labor, unhygienic factory conditions, and of

a total disregard of the health and life of the employees had greatly prevailed, is, happily, a thing of the past; nor is State sanitary control regarded any more as a specter of a "coming slavery"; and any exercise of the police power of the State is thoroughly justified if it can be shown that it will promote public health.

As a most valuable prophylactic measure in the prevention of disease and promotion of public health I consider medical factory inspection. By medical factory inspection I comprehend a most thorough and far-reaching industrial supervision, as follows:

(*a*) State licensing of trades and industrial establishments;

(*b*) Physical examination of all candidates for employment;

(*c*) Periodical examination of all employees;

(*d*) A study of industrial pathology, and

(*e*) Appointment of qualified physicians by the State labor bureaus.

Such a scheme of medical supervision of industries will, I trust, not be regarded as too revolutionary or socialistic, for it is but a logical extension of principles upon which much of existing sanitary legislation is based, and a step in accordance with sanitary measures already in force.

(*a*) The licensing of trades is already an established fact in many States, and has been justified, either by reason of the offensive nature of the trades, such as of slaughter-houses, bone-rendering, carpet-cleaning, and other establishments; or by reason of the necessity for a specially qualified personnel, as in the plumbing, locomotive-engineering, and other trades. There is no reason why preliminary licensing of trades should not be extended, first, to all dangerous and offensive trades and establishments, and then to all other trades. Such a licensing, by reason of the preliminary inspection and insistence upon hygienic requirements, would be a powerful weapon in the prevention of industrial diseases and accidents and in the promotion of public health.

(*b*) The preliminary physical examination of candidates for employment is already established in the Federal, State, and municipal services, and has also been adopted by many private corporations, especially railroads, etc. Indeed, there could not be any greater radical measures against excessive morbidity in industries than a rigid examination and rejection of all physically unfit for their duties, and of those suffering from incipient diseases.

(*c*) If to the preliminary physical examination of employees we should add stated periodical examinations in all industrial establishments, a mode of procedure already in practice in many public and private institutions, we should certainly be able to save more lives than by all the other preventive measures.

(*d*) The study of industrial pathology is of paramount importance in the prophylaxis of industrial diseases, and cannot be properly carried on but

under conditions which would allow the supervision of industries by medical men, as has been amply proved by the great work accomplished in this direction by the physicians of German Krankenkassen-vereins.

(*e*) It is obvious that such a scheme of industrial supervision as outlined cannot be carried on without the appointment of properly qualified physicians.

Medical factory inspection is a theme already widely discussed abroad, and one of the resolutions of the last International Congress of Hygiene, in Berlin, 1907, was that this subject be agitated for and the public be educated to regard it an important sanitary measure. In Belgium there were appointed, in 1895, four local and one general medical factory inspectors. In the Netherlands there has been a "medical factory adviseur" since 1903. In Great Britain the participation of physicians in factory inspection dates from 1833, when the corps of certifying surgeons was established. There are more than 2000 such surgeons at the present time, and their activity in industrial supervision is very pronounced. Since 1895 there is also a medical factory inspector for the whole kingdom. There is also a compulsory notification of industrial poisonings. In Germany there is, since 1883, a law requiring the licensing of certain dangerous trades, and the preliminary physical examination of employees before employment, as well as a periodical examination after employment, and since 1883 the participation of physicians in industrial supervision is steadily increasing.

In the United Stated the State of New York is the pioneer in the appointment (1907) of a medical factory inspector, a progressive measure due to the demand of Commissioners Sherman and Williams, of the New York State Labor Bureau. Factory legislation in the United States has been more of an economic character, owing, probably, to the fact that it was promoted mostly by labor unions, but it is time that such legislation should partake more of a sanitary character, especially in the proper control of dangerous and offensive trades. This can be accomplished only by the agitation by medical organizations and by a body like this.

Conclusions.

1. Medical factory inspection is a legitimate exercise of the police power of the State, because it would be a powerful weapon in the prevention of disease.

2. Most occupations have elements of danger causing mutilation, disease, and death of the workers.

3. Most, if not all, of the dangers and risks of trades are preventable.

4. An ideal industrial supervision should include the following: (*a*) State licensing of trades and industries; (*b*) physical examination of all employees before employment; (*c*) periodical examination of all employees;

(*d*) study of industrial pathology; and (*e*) appointment of qualified physicians.

5. The appointment of physicians as factory inspectors has been agitated for in the Continental press, and has already been introduced in some countries, as well as by the State of New York.

6. This is a proper subject for the National Association for the Study and Prevention of Tuberculosis.

Inspeccion Médica de las Factoriás.—(PRICE.)

La inspección médica de las factorías es un ejercicio legítimo del poder de la policía del Estado, por que esto será un factor poderoso en la prevención de la enfermedad.

La mayor parte de las ócupaciones tienen elemetos de peligro capaces de causar mutilación, enfermedad y muerte de los obreros.

La mayor parte, sino todos los peligros de las ocupaciones pueden prevenirse. Una supervisión ideal de las industrias debe incluir lo siguiente:

(*a*) Licencia del Estado para las ocupaciones y las industrias.

(*b*) Examen físico de todos los candidatos de empleos.

(*c*) Examen periódico de los empleados.

(*d*) Estudio de la Patología industrial.

(*e*) Nombramiento de médicos competentes para la inspección de las factorias.

El nombramiento de médicos para la inspección de las fabricas se ha comentado en la prensa continental, y ya se encuentra introducida en algunos países lo mismo que en New York.

Inspection médicale des Usines.—(PRICE.)

L'inspection médicale des usines est un exercice légitime du pouvoir de police de l'Etat, parce qu'elle est un facteur puissant pour la prevention des maladies. La plupart des occupations ont des éléments de danger qui causent la mutilation, la maladie, et la mort des ouvriers. La plupart et peut-être tous les dangers et les risques des métiers peuvent etre évités. Une surveillance idéale d'industrie devrait comprendre les points suivants:

(*a*) Licensiement par l'Etat des métiers et des industries.

(*b*) Examen physique de tous ceux qui se présentent pour travailler.

(*c*) Examen périodique de tous les employés.

(*d*) Etude de pathologie industrielle, et

(*e*) Emploi de médecins capables comme inspecteurs des usines.

L'emploi de médecins comme inspecteurs des usines a été discuté dans la presse continentale, et il a été déjà introduit dans quelques pays, de même qu'à New York.

Ärztliche Fabriken-Inspektion.—(PRICE.)

Ärztliche Inspektion von Fabriken ist eine legitime Ausübung der Polizeigewalt des Staates, weil sie ein mächtiger Faktor in der Verhütung von Krankheiten sein würde.

Die meisten Beschäftigungen besitzen Elemente von Gefahr, die Verstümmelung, Krankheit und Tod der Arbeiter verursachen können.

Die meisten, wenn nicht alle der Gefahren und Risikos in den Gewerben sind verhütbar. Eine ideale industrielle Aufsicht sollte die folgenden Dinge einschliessen:

(*a*) Staatliche Lizensierung von Gewerben und Industrien.
(*b*) Körperliche Untersuchung aller Arbeitsuchenden.
(*c*) Periodische Untersuchung aller Angestellten.
(*d*) Studium der industriellen Pathologie.
(*e*) Anstellung von praktischen Ärzten als Fabrikinspektoren.

Die Anstellung von Ärzten als Fabrikinspektoren wurde in der kontinentalen Presse erörtert und empfohlen, und ist auch in einigen Ländern sowohl als auch in New York eingeführt worden.

DISCUSSION.

DR. C. A. HARPER (Wisconsin) said that there are laws in Wisconsin which provide for the inspection of factories, live-stock, and dwelling-houses. This inspection is carried out by the Department of Labor, in conjunction with the Board of Health. The law for the inspection of dwellings and factories is practically the same as that of the State of New York. The old factories of the State are run on the "old plan of inspection," but great efforts are being made to improve the inspection in the same way as it is effected in the new factories, by making important changes which provide for plenty of fresh air for the operators. Wisconsin had been making a great crusade against tuberculosis: a movement which at first met with resistance on the part of the factory owners; but conditions have now changed and the inspection is carried out with the help of the factory owners, who have found that this improvement has an economic value to them.

RICHARD H. LEWIS (Raleigh, North Carolina): We all will admit that medical inspection of factories would be of value in the crusade against tuberculosis, and it is not worth while to discuss that aspect. Neither is it worth while to go into detail as to methods of inspection. The practical

question is, How are we to secure the inspection? Some of the speakers have advocated coercion by legislation. Now, in my judgment, that is a mistake. The people among whom I live, and who are, I take it, very much like other Americans, are very docile people, as a rule, but whenever an attempt has been made to drive them, they have rebelled. It is well known that laws cannot be enforced unless public opinion is behind them, and my own idea is that the best plan would be to have some sensible and reasonable person lay the facts before the manufacturers, and, as they are generally not only sensible, but also humane and able to appreciate the advantages that would accrue to themselves as well as to their employees, they would almost surely respond. It would also be well to educate the employees as to the conditions necessary to their health. Ninety-nine out of one hundred, in all probability, would not heed the instructions, but the one-hundredth man would learn, and the result would be such a sentiment among them as to demand of the employer such conditions as may be necessary for health. The demand for mill labor is so great that the employer would be particular to respond to any reasonable demands. It is easier to lead people of intelligence and force of character than it is to drive them.

SANITARY MEASURES IN THE HOME IN RELATION TO TUBERCULOSIS.

By Dr. W. A. Evans,
Commissioner of Health, Chicago.

Tuberculosis is a disease of major sanitary importance. This need not be discussed. Parenthetically, I would like to suggest that the next revision of the international classification should divide diseases into groups according as they are or are not of sanitary importance.

A study of Chicago statistics proves that consumption and its two companion diseases, pneumonia and bronchitis, are becoming of greater importance each year. The increase in pneumonia is apparently of greater importance than it really is. Much of the bronchitis of the leaner pneumonia years is now found in the pneumonia column. We decrease the sum total of statistical error when in mortality tables we call all acute bronchitis pneumonia, and all chronic bronchitis tuberculosis.

Viewing it as a disease of major sanitary importance, we need only consider two means of spreading—air and milk.

Beginning with 1878 and studying the three ten-year periods, we find that the death-rate from consumption is falling very slowly.

1878 to 1887	17.151 per 10,000 living
1888 to 1897	17.204 " 10,000 "
1898 to 1907	15.440 " 10,000 "

The rate for 1908 will be (materially) less than for the ten-year period or for any year for the thirty-year period. While this is true, the consumption mortality in relation to the total mortality is increasing in each ten-year period.

1878 to 1887, percentage of total mortality	8.65
1888 to 1897, " " " "	9.176
1898 to 1907, " " " "	10.628

The death-rate from consumption, judged by ten-year periods, was improving slightly; the general death-rate was improving disproportionately; therefore the consumption death-rate in proportion to the total death-rate is getting a little larger all the time. Some part of this is due to the improve-

ment in infant and child mortality, allowing a larger number of people to attain the consumption age.

The under-five-years-old mortality from all causes in proportion to 1000 of population was:

1878 to 1887	10.5
1888 to 1897	9.7
1898 to 1907	4.66

If we mass tuberculosis, pneumonia, and bronchitis, and study them in the same ten-year periods, we find:

1878 to 1887	12.011 per	1000	living
1888 to 1897	14.587 "	1000	"
1898 to 1907	13.544 "	1000	"

or, percentage of total death-rate:

1878 to 1887	6.193
1888 to 1897	7.664
1898 to 1907	9.304

If we calculate the rate on bronchitis and pneumonia, added, we find:

First decade	9.627
Second decade	12.185
Third decade	12.696

While no study of pneumonia should be made without adding bronchitis to it, we find that false reporting or change in standard of reporting is not wholly responsible for the apparent increase in pneumonia. Pneumonia and consumption are increasing, bronchitis is decreasing as a returned cause of death, but the decrease is not proportioned to the increase in the other two causes.

Studying the forms other than consumption, we find that for the first decade it averaged 132.1 deaths a year, 1.10 per cent. of total mortality; for the second decade, 261.3, 1.14 per cent. of the total mortality, and for the third it averaged 449.9, or 1.68 per cent. of the total mortality.

Tuberculosis other than pulmonary is increasing in Chicago. It is causing a somewhat larger death-rate each year. Comparing its percentage of the total mortality with that of pulmonary tuberculosis, we find that it is increasing faster than the pulmonary forms. Calculating on the same basis as the proportion of other tuberculosis to pulmonary, in the first decade we get 1.24. The rate was 1.14. There was, therefore, a moderate decline in the second decade.

The same basis of calculation for the third decade, 1898 to 1907, would give 1.36. The rate 1.68 therefore shows a disproportionate increase.

I interpret this as meaning that the remedial measures against air-borne tuberculosis have been more effective than those against food-borne tuberculosis during the last decade.

I see in the consumption question two requisites of surpassing importance—and many lesser ones. The two major are early diagnosis and air purification; the lesser ones are better living, less whisky, better housing, sanatoriums, hospitals, etc.

Each patient, human or animal, is the major factor in prevention—other things are more or less theoretical: this is a certainty. If there could be tuberculin diagnosis—or any other diagnosis, if it were available—when the disease was curable in three months, there would be no consumption question. Cure would be universal and the contagious stage would not be reached.

The other major factor is air purification. Is it not suggestive that lung diseases are not following the otherwise universal downward curve? It is said that a man can live for three weeks without food, three days without water, and three minutes without air. If this be true, why is it that we spend millions on food inspection, billions on water, and next to nothing on air? Should not the order be reversed?

Occasionally it happens that consumption can be traced through a family closely associating or through a group of people other than a family closely associating. However, the tubercle bacillus has but a feeble tenure of life in a house. Such home infections are exceptional. Every year we have such an illustration in Chicago, and we use it to the full, but, outside of lodging-houses, multiple cases in the same house within two years beyond the period of viability of the tubercle bacillus under house conditions are rare according to our registration. It is true that the chronicity of the disease makes the weighing of etiological data most difficult.

This means either that the tubercle bacillus has a short tenure of life in a house or else that cleansing is efficient, or both. The literature would indicate that the first of these is the more potent factor.

To prevent house infection in Chicago we have a hospital for late cases, with a bed capacity of 325. A hospital for late cases, in that it prevents house infection, is the most useful type of hospital. We forcibly hospitalize those cases which are most dangerous to the community. Our registration system is fairly effective. When the case goes to the hospital or moves, the house is disinfected by the sheet method. A recent improvement in this method is to warm the fluid while the windows are being pasted, and then to saturate the sheets with hot formalin.

In the city of Chicago from September 1, 1907, to September 1, 1908, we disinfected 61 million cubic feet of room space. Of this, 14.8 millions was for tuberculosis; 20.6 millions was for scarlet fever; 17.8 millions was for diphtheria. In my opinion this order should be reversed.

In our tuberculosis hospital we handle sputum cups in the following manner. The night cup is an ordinary graniteware cup with a large opening. In the morning these are placed in the steam sterilizer under light pressure—eight to twelve pounds. The heat not only sterilizes, it also liquefies the mucus, so that it runs easily. The cup is easily cleaned.

For the last five years we have kept a double record on pulmonary tuberculosis. The one, alphabetic, serves to keep track of the patient. The other, by houses, arranged by streets, shows those houses which have been concerned in tuberculosis.

In my opinion, the chance contact of the larger population unit is the greater factor in the spread of consumption—breathing the vapors of the talking, coughing, mouth-breathing, or sneezing consumptive who stands next you in a crowded street-car, or hall, or working place. The larger number of contacts increases the probability of contact with a consumptive. Coupled with this is a greater average carelessness. Generally speaking, the air of the home contains more chemical impurities, more CO_2, more CO, generally SO_3, than that of a street-car or workshop. But such chemical substances determine the clinical history of an infection more than the infection itself.

Hoffman shows that the improvement in the tuberculosis situation in this country is due to improvement among women. The rate among men is not improving. Home infections are decreasing. Workshop, street-car travel in the rush hours, hall consumption, is not improving. Such illustrations as those of Indians housed, being wiped out by consumption, cannot be charged against the houses alone. Housed Indians are Indians changed in every particular. While the conditions which conduce to consumption and which determine the course of consumption are less important than the man who has the disease, from the standpoint of spread they are of great consequence. There must be protection of the air-supply commensurate with the importance of that supply in all centers of population: electrification of railroad terminals; smokeless coals on tugs and vessels—so much for migratory boilers and fire boxes; fixed boilers must be properly built and properly operated; gasoline motors must be controlled; dust occupations must be controlled; all places where men congregate must be ventilated.

In such ventilation two fetiches must be killed: First, the draft mania; and, second, the dilution standard. Bacteria, being solid, do not conform to the laws of dilution of liquids, and still less of fluids. In so far as we are able we must avoid mixing the fresh air with the foul. The expiration air, laden with tubercle bacilli, pneumococci, diphtheria bacilli, must be allowed to rise from heat and find its exit at the ceiling and be replaced with fresh air from below. This is true of bedrooms, offices, workshops, stores, halls, street-cars, and lodging-houses. The factors to be taken into account are:

1. Temperature: A warm temperature acting in the main by preventing the foul air from rising out of the breathing zone.

2. Humidity: Room air, and especially bedroom air, generally being too dry.

3. Odors from the human body.

4. Dust.

5. Most important—pathogenic bacteria.

Some of the special problems and their solutions are:

Street-cars: one hundred and twenty-five passengers in a new type car with inclosed platforms will require a change of air three times a minute if the deck sash is used to take out the bad air and put in fresh air. A change every three minutes is enough if the fresh air is put in warmed below and the foul air is taken out above. The method devised is: first, a small two-thirds horse-power motor in the ceiling driving the air out; second, intakes at the side taking the air in over heaters and delivering it in the car at 50° F. Closed deck sashes. Cleaning by blowing compressed air.

Lodging-houses: Exhaust fans at the ceiling. Intakes near the floor. The fresh air to pass through radiator coils or else through stoves or hot-air chambers.

Halls and offices: Intakes near the floor; air warmed; exits near the ceiling.

Bedrooms: Windows opened above and below.

Work-places: Equipped with dust-suction tubes.

Medidas Sanitarias en el Hogar.—(EVANS.)

La Tuberculosis es una enfermedad de la mayor importancia sanitaria.

Se transmite por medio del aire y de la leche; el uno es usado universalmente, la otra, en gran escala.

Las personas y vacas infectadas son dificiles de cuidar debido a la cronicidad de la afección y á la lenta inhabilitación.

La tuberculosis se propaga por el aire de los salones, carros, lugares de trabajos y otros sitios de reunión asi comi en los hogares.

Los hogares propagan la tuberculosis de dos modos: (*a*) Por infección. (*b*) Disminución de la vitalidad: 1. determinando la infección, y 2. determinando los resultados de la infeccion.

Discussión de: (*a*) Hogares infectados. (*b*) Malos hogares. (*c*) Casos de alojamiento.

La ventilación en sus relaciones con la propagación de las enfermedades: (*a*) Temperatura. (*b*) Humedad. (*c*) Acido Carbónico. (*d*) Otros gases nocivos. (*e*) Flora de las bacterias.

Mesures sanitaires dans les logements.—(EVANS.)

La tuberculose est une maladie d'une importance sanitaire majeure.

Elle est transmise par l'air et le lait, le premier étant d'un usage universel et l'autre d'un usage presque universel.

Il est difficile de contrôler les personnes et les vaches atteintes, en raison de la chronicité de la maladie et de sa marche prolongée.

La tuberculose transmise par l'air se contracte dans les salles, les tramways, les ateliers et autres lieux de réunion de même que dans les maisons.

Les logements propagent la tuberculose (*a*) en étant infectés; (*b*) en diminuant la vitalité—premièrement en causant l'infection et deuxièmement en causant les résultats de l'infection.

Discussion de; (*a*) logements infectés; (*b*) mauvais logements; (*c*) hôtels meublés.

Ventilation dans sa relation avec la propagation de la maladie: (*a*) température; (*b*) humidité; (*c*) dioxide de carbone; (*d*) autres gaz délétères; (*e*) flore des bactéries.

Sanitäre Massregeln in den Wohnungen.—(EVANS.)

Die Tuberkulose ist eine für den allgemeinen Gesundheits-Zustand höchst wichtige Krankheit.

Sie wird durch die Luft und durch die Milch verbreitet—die erste von Allen gebraucht, die leztere von sehr Vielen.

Die infizirten Leute und Kühe sind infolge des chronischen Verlaufes der Krankheit und des langsamen Unfähigwerdens der Kranken schwer zu pflegen.

Tuberkulös infizirte Luft befindet sich besonders in Sälen, Strassenbahnwagen, Werkstätten, und anderen Versammlungs-Orten, wie auch in Wohnungen.

Die Wohnungen verbreiten die Tuberkulose in folgender Art: (*a*) weil sie infizirt sind; (*b*) weil sie die Widerstandskraft heruntersetzen: (1) Infektion verursachend; (2) Infektionsresultate verursachend.

Diskussion über: (*a*) infizirte Wohnungen; (*b*) schlechte Wohnungen; (*c*) Herbergen.

Die Ventilation in Verbindung mit der Verbreitung der Krankheit: (*a*) Temperatur; (*b*) Feuchtigkeit; (*c*) Kohlenbioxyd; (*d*) andere schädliche Gase; (*e*) bakterielle Flora.

TOWN PLANNING IN RELATION TO THE ANTI-TUBERCULOSIS CAMPAIGN.

By Benjamin C. Marsh,

Executive Secretary of the Committee on Congestion of Population in New York City.

"Town Planning in Justice to the Working Population" is the title the writer recently gave to an article, because numerically the working class is the class most directly and vitally benefited by the normal development of the city in insuring healthy conditions of home, workshop, office, and school.

If we once ascertain and agree upon the conditions which cause and predispose to tuberculosis, we are in a position to standardize the conditions of living which must obtain, and we can then frankly recognize that no warfare against tuberculosis is effective until society demands and secures this minimum standard of light, air, and space.

Dr. Koch, in the British Congress on Tuberculosis in 1902, said: "It is the overcrowded dwellings of the poor that we have to regard as the real breeding-places of tuberculosis. It is out of them the disease always crops up anew, and it is to the abolition of these conditions that we must first and foremost direct our attention if we wish to attack the evil at its root."

Dr. George Newman, in his book on the "Health of the State," frankly admits that phthisis varies in proportion to density of population. "In the center of London, Manchester, or Birmingham phthisis mortality is higher than on the circumference of these towns. There are, of course, many causes for this, but, undoubtedly, one is density of population—that is, overcrowding."

In the valuable monograph on "Housing" by Alden and Hayward, England's standard for housing is enunciated. "The minimum for the average workingman's family is a cheap but well-built house, with four or five suitable rooms, together with a quarter-acre garden, or at least with a fair-sized courtyard. The site should be a healthy one and the house perfectly sanitary, well lighted, well ventilated, and well drained. And this accommodation must be supplied at a low rental, or it will be found beyond the means of the working classes."

Dr. George M. Kober, in his "Industrial and Personal Hygiene," says: "The natural light in workshops should be sufficient so that the eyes need

not be strained even on cloudy days. When the light is defective, the objects have to be brought too near." Dr. Kober, in his discussion, illuminates the relation of the conditions of factories to health, and he advocates strongly a higher standard of cubic air space. Every occupant of a room should have a cubic air space of 1000 feet, the amount, incidentally, provided by the Act of 1906 amending the Factory Law of New York State, but merely for certain manufactures in tenements. He admits that such an ideal standard is not always attainable in workshops, and it is believed that for particular purposes, he states, an air space of from 400 to 500 cubic feet per capita will suffice. New York State requires but 250 cubic feet per capita, even in those centers of industrial tragedy in lower Manhattan blocks in which factories cover all but 3 per cent. to 5 per cent. of the entire area.

The propriety of the consideration of this problem in this section lies in the fact that this standardizing, or even a remote approximation to the standard advocated, cannot be secured by private charity. It is fundamentally and essentially the function of government, and no preconceived objections to what is considered paternalism, socialism, or any other "isms" should be permitted to detract attention from this fact.

Governor Hughes, in his powerful address on the opening night of the Exhibit of Congestion of Population in New York, recognized that we have only begun to appreciate what the proper exercise of the police power in a State will accomplish.

Germany has taken a high standard in housing reform recently, and the various provinces are enacting legislation providing for better housing and better industrial conditions. In 1902 Herr Braun, President of the Department of Agriculture, Commerce and Manufactures in the Hessian Ministry, says that "when the committee which prepared the bill on housing had gained the conviction that the housing question in relation to the poorer classes is a land question and a credit question, there could be no doubt that the State and the towns must be asked to help in dealing with it, as apparently it was only in that way that the object sought could be gained. For it is the first condition of success that land which is necessary and suitable for the erection of houses for working people, both in town and country, shall be secured by timely and quick action. Rents in right relation with the means of the poorer classes can be insured only if sites suitable for working people's houses, and the houses on the sites, are taken for all time out of the reach of speculation. In many cases the erection of a single house, at a comparatively great distance from sites with which speculation is possible, suffices to cause a great increase in the price of neighboring sites, and this increase cannot fail to raise rents. The early purchase of land in all parts of the country must therefore be regarded as the first duty of the towns, rural communities, and societies of public utility. Encouragement to take this

course ought to be given, especially by the offer of a large measure of help by the State."

To this conviction Americans must, unquestionably, ultimately come, as we are recognizing the just functions and field of preventive effort included in the scope of governmental action.

We must admit, first, that the use of the land, or the permitted use of land, is the main factor in determining its value, modified, of course, by conditions of transportation and other local conditions.

Merely the general scheme of town planning, which, in its most comprehensive sense, originated in Germany, can be here presented. Its relation to the problem of fighting tuberculosis will be immediately apparent, and it will be admitted that only by securing conditions connoted in town planning can we adequately fight tuberculosis in cities.

In outline, town planning involves the determination by the city of the lines of its development. It means that the city sets a standard for density of population which, while recognizing the values which the inner sections have acquired through the unrestricted, and hence too intensive, use of land, grades the use to which land may be put to secure, as near as possible to the city center, a requisite standard of living and work for its population.

First, it establishes zones within which buildings of a certain height and a designated number of stories may be erected, and determines the proportion of the area that may be built upon, both in front and in rear lots, where the height of buildings is even more carefully restricted. It determines the heights of rooms in these zones, the relation between the window space and floor space, and the living conditions.

Second, it determines the general plan of development of the city, laying out the main streets and the secondary streets for a long period in advance, usually twenty to twenty-five years, with the relation of the width and material of the streets to the nature of the zones.

Third, it determines the districts within which factories may be located, and prohibits their erection in certain districts.

Fourth, it makes ample provision for parks, playgrounds, and open spaces.

Fifth, an extension plan provides for adequate means of transportation for both freight and passengers. Cheap land and cheap transportation are essential in fighting tuberculosis, and these the true extension plan seeks to insure by preventing speculation in land. These, further, cannot be secured by any private philanthropic effort. The net results of such private pseudo-philanthropic effort has been to exert often a centrepitizing force, keeping people in congested districts.

Fresh air, rest, and good food are the standards, emphasized over and over, in this tuberculosis exhibit, and are essential to the prevention of tuberculosis. It is difficult to inject fresh air into a tenement-house block with a density of

500 to the acre. New York has many blocks with a density of 1000, which cover from 65 per cent. to 75 per cent. of the site.

Rest is difficult to secure in the hubbub of tenement life and in the congestion of crowded rooms. Good food can better be secured where the rent necessary for maintaining a decent standard of privacy does not take from 25 per cent. to 35 per cent. of the earnings of the entire family—an admitted condition in scores of thousands of families of laborers in New York.

It is significant that most of the German cities which have adopted town planning also believe in municipal ownership, and the city owns and operates the street railways, gas-works, electric-light plants, and other productive enterprises. It is noticeable also that these German cities, as also the Swiss cities, which are adopting town planning, are emphasizing the municipal ownership of land, and many of them own from 10 per cent. to 50 per cent. of the land within their boundaries.

Congestion of population is not a problem of the city of half a million, any more than tuberculosis is a problem of such cities, and this Section of the International Congress on Tuberculosis would take a high and advanced ground if it put itself on record as recognizing that no effective warfare can be waged against tuberculosis without a systematic plan for the development of every city, and could adopt a standard of the number of cubic feet of air space and admit that natural light should be provided for all workers in factories, stores, and offices.

During the past four months the writer has gone with Mr. Weller through the neglected neighborhoods of Washington, which are, as he suggested, a disgrace to any city, although Washington is reputed to be a beautifully planned city, and the radial lines are indeed picturesque and pleasant in their symmetry and proportion. He has received the sorrowful admission from the head of the Administrative Bureau of Hygienic Service in Paris that Baron Hausmann's magnificent plans for the boulevards and park adornments of Paris have not kept that city from developing conditions which will require the expenditure of millions of dollars in the demolition of buildings, and the experience of the capital city of every country corroborates the judgment of these two experts that a different method of preventing tuberculosis, or the spread of tuberculosis, is essential.

In this new program of prevention town planning is the first step.

A SUGGESTED LAW TO REGULATE HOUSE VENTILATION FOR THE PREVENTION OF TUBERCULOSIS.

By Charles Denison, A.M., M.D.,
Denver, Colorado.

Millions of lives and billions of hours of existence of human beings might be saved if we only knew the true relation of the atmospheric air to this dread scourge—tuberculosis. Though approaches to the lessening of mortality rates from tuberculosis have of late years been noted through the outdoor method of treatment so universally adopted, yet the disease exists; therefore we do not know the relation it bears to the atmosphere which harbors it. If we did, we could conquer, or rather prevent, the disease. Why do we not know this relation? I believe the answer is, because we do not know the relation electricity bears to respiration and to the oxygenation of the blood; and that our physiologists may possibly have misled us in their text-books for the same reason on their part. Had they known the function of electricity in respiration and hematosis, they might not have taught us that life is supported by the oxygen absorbed from the inhaled air, in order to account for the oxygen in the carbonic acid exhaled. Had they reckoned that electricity is universally present and an essential ingredient in every natural breath of air inhaled, they would have accounted for its presence in the delicate chemical changes whereby in hematosis the carbon is thrown off and the oxygen in the blood-stream raised to a purified state, or perhaps to its allotropic form—ozone. The dilution of the oxygen in the air by approximately 79 per cent. of nitrogen can be considered as a provision of nature for controlling an element too powerful in its uncombined state, and the instability of the oxygen molecule is probably the best proof we have of its close relation with electricity. It is very desirable to learn how it is that this force governs, as it seems to do, this changeableness of oxygen.* We must know

* The carbon being so much finer in the atomic scale compared with oxygen, it might perhaps be warranted by the facts to consider the process as one of electricity infusion and carbonic-acid gas transfusion through the pulmonary membrane, the oxygen of the air being the *conveyer* and the oxygen of the blood the *receiver* of the electricity. This is mentioned as only a suggested hypothesis by the author, who knows he has no right, from his own limited knowledge of physics, to make any authoritative statement whatever as to what electrically occurs in hematosis. However, against the prevailing belief in the absorption of so much oxygen in respiration, in addition to that taken in food and drink, there is perhaps ground for an explanation of the process of hematosis which includes electricity as an essential agent in the process.

the relation of electricity to this process of respiration before we can fully understand the relation of atmospheric air to tuberculosis.

So, likewise, in the study of the subject of ventilation, we come against the same sort of difficulty. We do not know how much of a departure from outdoor conditions is compatible with perfect health, and, for the same reason, namely, our lack of knowledge of the vitalizing effect there is in the electricity content of the air. There is a principle in law, handed down from old Roman times, "He knows not the law, who knows not the reason of the law." We may not be permitted now to know the full reason of a law of ventilation which will be preventive of tuberculosis to an extent which will render this an insignificant disease compared with other now lesser sources of mortality. Yet we can work out the proofs of the need of such a law through the study of the separate attributes of the atmospheric air, with special reference to atmospheric electricity. Such a study will help to show the universality of an electric content of the air we breathe; the necessity of animal life depending upon it; and the degeneration productive of tuberculosis, or the susceptibility thereto, which comes with defective or deficient ventilation.

The former belief in the burning of the blood's carbon by the oxygen, through the lungs, falls short of an explanation of the needs of ventilation, because it leaves out a factor we know to be constantly present wherever the air penetrates—that is, electricity. The potency of this element is such that it may not be ignored wherever it may be, and that potency, in the ordinary conditions of life, is ever for good. It is therefore unquestionably operative in the process of breathing. This electricity is in and from the sunlight; the argument is therefore conclusive that the presence and potency of the sunlight, and the free and abundant supply of fresh air, with its adequate and ample electricity, is the essential environment for both the prevention and cure of tuberculosis. Electricity, sunlight, and ventilation are three cardinal principles in the prevention of this dread scourge, and should be in demand in all our curative measures.

The "starvation of air" which will account for the existence of this disease must receive a different interpretation from that of the "danger-point" due to carbonic acid saturation, which has up to now been the generally accepted explanation of the toxic results of deficient ventilation. We can live through such toxic states, supported by a vitalized supply of oxygen within our bodies, without which we would die at once. Dr. Angus Smith could comfortably, though temporarily, exist in his lead chamber till after the flame of his candle had gone out from lack of oxygen with which to burn.

Physiologists admit that there is no adequate explanation, in the carbonic acid exhaled in confined space, of the remarkably good effect of outdoor life in the treatment of tuberculosis, and that there must be something,

radio-activity or some electric attribute in the air, which would satisfy the need of an explanation.

Sir Benjamin Richardson revived his drooping doves and rabbits with his current of static electricity introduced into his hermetically sealed jars, where these birds or animals were allowed to remain until they had supposedly used up all the oxygen, or were dying from the toxic effects of their own carbonic acid exhaled. Through simply electric stimulation the "fatal air" in his jars "was again made capable of supporting life," from which he concluded that the oxygen is "devitalized" during respiration, and the electric spark has the faculty of "revitalizing" it.

In 1895 Drs. J. S. Billings, S. Weir Mitchell, and D. H. Bergey, under the Hodgkins Fund, made a report to the Smithsonian Institution on "The Composition of Expired Air and its Effects upon Animal Life." Among the many experiments tried, the "Hammond," "The Brown Séquard," and the "Richardson," in which the amount of oxygen remaining in the confined space in which animals had died was determined, there were quite a number in which there was enough oxygen left for the animals to have lived on had it been electrified like the natural air outside the closed jars. They even tried the Richardson experiment and showed that it was not always the deprivation of oxygen in confined space that killed the animals therein, nor yet always the excess of carbonic acid; but, like the play of Hamlet with Hamlet left out, they did not complete Sir Benjamin Richardson's experiment in that they did not test the reviving power of electricity upon the dying animals in confined space. It is greatly to be regretted that this splendidly sustained opportunity to settle this important issue was not utilized.

Through the apparent disinclination of this commission to go any further than the consideration of the life-sustaining power of the oxygen of the air and the death-producing qualities of the exhaled carbonic acid, we are left to coincide with the closing sentence especially of the following quotation from their report: "In all cases tubercular diseases of the lungs and pneumonia are the diseases which are most prevalent among persons living and working in unventilated rooms. . . . It is, however, by no means demonstrated, as yet, that the only deleterious effect which the air of crowded barracks and tenement-house rooms, or of foul courts or narrow streets, exerts upon the persons who breathe it, is due to the greater number of pathogenic microörganisms in such localities. It is quite possible that such impure atmospheres may affect the vitality and the bactericidal powers of the cells and fluids of the upper air-passages with which they come in contact, and may thus predispose to infections, the potential causes of which are almost everywhere present, and especially in the upper air-passages and in the alimentary canal of even the healthiest persons; but of this we have, as yet, no scientific evidence. *It is very desirable that researches should be made on this point.*"

However much we may fall short of a full understanding of the etiology of tuberculosis, we all agree that it is a disease of environment, whether causative or curative. In either case, whether for cause or cure, the physical conditions are preëxistent to the life of the germ, and should here absorb our attention. The advent of this germ cannot warrant any precedence in the etiology of tuberculosis over the deficiencies of these physical attributes of the air. The well-known facts of our civilization prove these deficiencies to exist in our badly ventilated abodes. Confirmation of the needs of more and sun-treated air comes through the almost universal adoption, all over the world, of the outdoor treatment for tuberculosis, which some of us have been advocating for over thirty years. The solution of this tuberculosis problem, then, rests upon another well-known fact—that tuberculosis is essentially a house disease. This statement rests firmly on the multitudinous evidence which may be brought out in favor of the very close relation of tuberculosis to indoor life.

We have time only to briefly mention that aboriginal races are practically free from tuberculosis in their native outdoor life, but become, as did the American Indian, most susceptible to the disease when they adopt the indoor life of their civilized conquerors. Even the Esquimos, living in the Arctic regions, where tuberculosis would otherwise be an impossibility, may have the disease because of the close, unventilated, and unlighted huts in which they stay.

Dr. Chalmers, of Glasgow, in showing the relation of tuberculosis to poverty, has given us statistics for his city of the tubercular mortality in families represented by children attending school; *i. e.*, according to the number of persons living in a room. The mortality rate in homes where there was one to the room was 3.4 per cent. from tuberculosis; where there were two to a room, 5.9 per cent.; and where there were three to a room, 8.3 per cent. No better evidence of the relation of space per capita to the increasing mortality from tuberculosis could be asked for, though these statistics were obtained for another object—the poverty of purse rather than the poverty of room space.

Animals, as well as man, when transferred from a natural and open existence to a life of captivity, with its usual confined space, show the same acquired susceptibility to this disease. I once had an opportunity to study the effect of the environment, the inbreeding, the confinement, and other conditions causing tuberculosis on a herd of some forty short-horn cattle imported from England to a farm near Denver. This was about thirty years ago; within ten years thereafter the whole herd was decimated by this disease. How much continual inbreeding and infection added to the effect of the close confinement of these cattle may be left undetermined. I inspected the remnant of seven head, all thoroughly tubercular. The other males had been sold off

wherever found to be diseased, to be mixed in with native stock in northwestern Colorado. Those cattle sold lived almost entirely in the open, and not only did they themselves seem to lose the evidences of the disease, as I understand, but their progeny, born of the native stock, turned out to be the best beef cattle in the State, three-year-olds, often selling for four-year-olds, as estimated in an eastern market.

Tuberculosis is essentially a house disease. Now, why and how is it so?

The answer to that question ought to settle the question of prevention. Admitting that it is a house disease, its spread is for one of two reasons: first, because there is greater opportunity for infection in houses; second, because of the diminished space, with or without limited light, allotted to the residents. Now, we find the first theory untenable, for the germs have had "no standing in court," and are not in evidence until after susceptibility due to atmospheric conditions exists. The space explanation is, however, reasonable, and ought to be clearly understood. Our greatest difficulty is our ignorance of the required sufficiency of space per capita in a sleeping- or living-room, to equal normal, or rather preventable, conditions even for the average individual. We individually think we know what ought to be the legal minimum limit and what ought to be the generally acknowledged preventable or healthy limit per capita space, renewed once per hour—as did the renowned writer on public hygiene, Dr. Parkes. However, I may say that the number so gifted with advanced knowledge on this most important subject is not great, and the masses are practically without the insight which would enable them to understand the principle of hygienic ventilation. In this unknowing class I include the legislative bodies, who ought, above all others, to be fully posted so as to act in this matter. What is needed is general and thorough knowledge upon this important theme of ventilation, up to which the study of these physical attributes of the air in relation to tuberculosis has led us.

Then what is further needed is such a pronounced and authoritative statement of rules or laws of house ventilation that the same will be broadly accepted as a basis of legislation for home and building construction.

The great problem before us is to apply, through building permits, supervision over renewable air space in residences, workshops, and public buildings, similar to that which the building inspector now has over plumbing to prevent sewer-gas from entering a room, or by fire-escapes, to prevent the destruction of life by a burning building. The State, by its police power, protects the community's life and health against individual greed, ignorance, or indifference.

The law should provide not only for a possible healthy renewable air space by night, but by day, if possible, a naturally electrified atmosphere; *i. e.*, warmed and lighted by the sun's rays. Having determined a minimum

health limit for renewable air space, the specification of the size and position of windows toward open and not toward shut-in areas will complete a provision which should do much for the limitation of tuberculosis.

A rule of house ventilation, which would be a guide for building inspectors, and a basis of police regulations in the interest of public health, must necessarily be limited to the natural method as distinguished from artificial or forced method: that is, if, as is necessary, the cost of construction and expense of heating are to be considered. With ventilation artificially provided, renewability of air would practically be all that would be required, provided the once breathed air could be drawn off so as not to be used again till refreshed—*i. e.*, revivified. In this case the problem of space per capita would not amount to much, as only a relatively small quantity of air would be needed, depending upon the size and activity of the breather's lungs.

But with the natural method, the air in a room must be diluted with fresh air and kept down to a healthy standard, so far as its bacterial content, its saturation by carbonic acid, or its devitalization through respiration or other use is concerned.

Here we must have a right estimation of both the cubic space per person and the continuous renewability features of the ventilation problem.

In making a rule of ventilation the maximum limit allowance does not matter. The air cannot be too pure for anybody. The minimum limit for health, governed by a danger-point yet to be determined, is what is needed. This must necessarily be a compromise between healthfulness and expense, because as air in inclosed space is not as pure as that outdoors, so there is none so free of expense. The cost of construction and of heating in cold weather must be constantly considered, and as we are dealing with tuberculosis, a disease of the poor and ignorant class, we are still more compelled to compromise the more expensive space to the advantage of the less expensive renewability feature of the needed law.

It has been the author's study to work out this problem to as near a healthful standard or rule as possible, in justice to and in consideration of the average poverty of the poorer half of mankind.

Parkes worked out the space per capita problem on the generally accepted basis of sufficient cubic measure of air in a room to keep down the carbonic acid to two parts in 10,000 on excess of the four parts already in the atmosphere, for one person; making six parts in 10,000 allowable carbonic acid impurity. This led to his rule, 3000 cubic feet per capita, renewed once per hour.

Du Charmant worked out the renewal problem under ordinary air movement, and allowing for the usual variation between indoor and outdoor conditions. His determination led up to an inlet and outlet opening equivalent to about a third of a foot in capacity, in order to give the required re-

freshing of the air in a room used by one person, and at the same time to keep down the percentage of carbonic acid below the average standard, supposedly the danger limit due to respiration. On a plan of making up through the facility of air renewal for decreasing space per capita, I have arrived at a one-third compromise between these two space and renewal determinations, *i. e.*, one-third less than Parkes' and one-third increased renewal above Du Charmant's rule for house ventilation, and propose the following:

"RULE OF MINIMUM VENTILATION.—*Two thousand cubic feet air space per person, renewed once per hour; the hourly refreshing of a room's atmosphere through an external opening one foot square being the method of renewal; a standard below which living-, sleeping-, and working-rooms should not be allowed to be built.*"

The utility of having the rule vary toward renewal, at the expense of the per capita space provision, will be apparent when it is considered that the renewal approaches the equivalent of outdoor conditions according to its frequency, and the smaller the space and larger the opening, the quicker will be the refreshing of a room's atmosphere. It is intended that the rule be adjustable to more persons in a room as well as to rooms of different capacities; for instance, double the renewability should be provided for either two persons to the room or for rooms one-half reduced in size, the purpose of the rule being to furnish the equivalent of 2000 cubic feet of fresh air per person, whatever the size of the room or frequency of renewal.

So, too, as the spirit as well as the letter of the law ought to be regarded, ample allowance ought to be provided for having nearly the equivalent of outdoor conditions when, as often happens in the summer-time, there is no wind and no difference in temperature between indoors and outdoors to favor diffusion of atmosphere. Then not only smaller sized rooms, but absence of open areas for window facings and insufficiency of sun exposure should be regarded in obeying this ventilation rule; for certainly narrow inclosed areas and very thick walls or those facing the north, through exclusion of sunlight and air friction, annul the effect of the rule and require compensation through equivalent increased renewal provisions.

Here is a rule which the writer submits ought to become a law, enforced through the police provisions of the State and municipality; to stand as an educator of the people in favor of the hygienic prevention of tuberculosis, and to satisfy the demand warranted by the house relation of the disease, for the control of tuberculosis through a ventilation law.

In conclusion it is fitting for us to consider the way to inaugurate a law of ventilation.

The question is not only *how* will you determine its provision, but *how* will you bring about its adoption?

I have thought of settling the essential features of the law by obtaining the consensus of the judgment of scientists, health commissioners, climatologists, and interested physicians over the whole United States, as to what should be the minimum per capita space on a given renewal basis, to be named in the rule. But such a consensus would only be a compromise. If the consensus result were a departure from accuracy, it would be because the biased or mistaken judgment of certain observers had so changed it. While a compromise, such as this consensus conclusion, would be preferable to no rule at all.

Then, as to the second question, how will the law be promulgated and put in force?

Is not the adoption and promulgation of a law as much the function of this International Congress, and especially of this Section, devoted to State and Municipal Control of Tuberculosis, as of any association of men in existence? We meet and tabulate the histories of personal and associated work along the line of sanitation and hygiene, but the records of our meetings are a collection of various and often opposing judgments, assembled together only preparatory to some future determination of definite action. It is time that we accomplished something for prevention. We may not be able to enact a law of ventilation, but we can adopt one for recommendation, to be enacted by all legislative bodies, which will have to do with its enforcement. Such action would stamp this body as superior to all like associations that have preceded it.

La Limitacion de la Tuberculosis por Medio de la Ventilación de las Casas. —(Denison.)

Siendo la tuberculosis practicamente una enfermedad del hogar, debido à la insuficiencia del cambio del aire y de la luz del Sol, qué ley de ventilación puede darse y ser cumplida para la prevención de ésta?

En una explicación ligera, y admitiendo ésta relación del hogar con la tuberculosis, una regla de la ventilación, lo cual es el objeto de esta comunicación, se presenta entre la regla del espacio de 3,000 pies cúbicos por una persona, y la regla del renuevo de Du Charmant que es aproximadamente dos terceras partes de un pié cuadrado de entrada y de salida, el renuevo del aire hecho cada hora. Esto como la base de una ley apropiada constituye una regla del mínimo de ventilación.

El objeto es de determinar un límite peligroso a la salud, que bajo este límite cuartos de habitacion, de dormir y de talleres no deben permitirse. El equivalente de las dos determinaciones mencionadas se encuentra en la regla siguiente, un efecto suficiente de los rayos solares sobre el aire son conciderados como suficientes en la ventilación de las casás, y una educación

y conocimiento de los peligros de la deficiente ventilación ayudará al mantenimiento y obediencia de la ley.

La regla de la ventilación mínima; 2,000 pies cúbicos de espacio de aire por cada persona renovado cada hora; el completo renovamiento del aire atmosférico cada hora depende del metodo como el aire es renovado.

Una regularización de ésta regla debera hacerse de acuerdo con el tamaño del cuarto, y el número de personas que habitan el cuarto, lo mismo que las condiciones de los rayos solares, a fín de tener provisión de una ventilación suficiente bajo lás diferentes circunstancias.

Limitation de la Tuberculose par la Ventilation des Maisons.—(DENISON.)

La tuberculose étant pratiquement une maladie de maison, due à ce que l'air n'est pas suffisamment renouvelé et que la lumière du soleil ne penêtre pas suffisamment, quelle loi de ventilation peut être projetée et appliquée comme préventif?

Pour expliquer brèvement, et présupposant la connaissance du fait de la relation qui existe entre la ventilation de la maison et la tuberculose, on peut formuler une règle de ventilation qui est l'objet de cette étude, règle qui sera un juste milieu entre la règle d'espace de Parkes—3,000 pieds cubiques d'espace pour une personne—et la règle de renouvellement de Du Charmant—une ouverture d'à peu près deux tiers de pied carré pour l'entrée et pour la sortie de l'air pour le renouvellement d'heure en heure de l'air. Ceci, comme base d'une loi désirée, constitue une règle du minimum de ventilation.

Le but est de fixer une limite où la santé est en danger, limite au-dessous de laquelle on ne devrait pas permettre de bâtir les salons, les chambres à coucher et les ateliers. L'équivalent des deux conditions cidessus se trouve dans la règle suivante, pourvu que l'on considère l'esprit de la loi et que le soleil ait un effet suffisant sur l'air pour assurer amplement des possibilités de ventilation dans toutes les maisons bâties à l'avenir; et pourvu que l'éducation et une connaissance du danger de ventilation insuffisante aident à maintenir obéissance à la loi.

La règle de ventilation minimum: 2,000 pieds cubiques d'espace d'air par personne renouvelés une fois par heure; le changement complet chaque heure de l'atmosphère d'une chambre étant la méthode employée pour renouveler l'air.

On peut modifier cette règle suivant les dimensions variées des chambres, et le nombre des occupants, aussi bien que suivant les diverses expositions du soleil, de manière à assurer ample ventilation dans tous les cas.

Einschränkung der Tuberkulose durch Haus-Ventilation.—(DENISON.)

Da die Tuberkulose eigentlich eine Hauskrankheit ist, abhängig von mangelhafter Erneuerung von Luft und Licht, welches Ventilierungsgesetz für ihre Verhütung könnte man planen und durchsetzen?

Die Tatsache dieser Hausbeziehung zur Tuberkulose annehmend, habe ich in diesem Artikel eine Regel der Ventilation ausgearbeitet, welche ein vermittelnder Vergleich sein soll zwischen dem Parke'schen Raumgesetze—3000 Kubikfuss Zimmerraum für eine Person—und dem Du Charmant'schen Erneuerungsgesetze—ungefähr zwei Drittel eines Quadratfusses Einlass- und Auslass-Öffnung für stündliche Erneuerung. Dieses, als die Basis für ein wünschenswertes Gesetz, wird eine Regel der Minimalventilierung gemacht.

Der Zweck ist, die Gefahrsgrenze der Gesundheit zu bestimmen, unter welcher Wohnräume, Schlafräume, und Arbeitsräume nicht gebaut werden sollten. Die Gleichwertigkeit der beiden obigen Bestimmungen wird in der folgenden Regel gefunden, vorausgesetzt, dass der Geist des Gesetzes und die Hinlänglichkeit der Sonnenwirkung auf die Luft in gehöriger Weise berücksichtigt und vorgesehen wird, um genügende Möglichkeiten der Ventilierung in allen künftigen Bauten zu sichern; und Erziehung und eine Kenntnis der Gefahr von mangelhafter Ventilation die Erfüllung des Gesetzes unterstützen.

Das Gesetz der minimalen Ventilation: 2000 Kubikfuss Luftraum pro Person einmal per Stunde erneuert; die vollständige stündliche Erneuerung der Zimmeratmosphäre ist die Methode der Erneuerung.

Eine Anpassung dieses Gesetzes ist beabsichtigt je nach den verschiedenen Grössen der Zimmer und der Anzahl der darin Wohnenden, sowohl als auch nach der schwankenden Aussetzung der Sonne, um unter allen Umständen genügende Vorbereitung für volle Ventilation bereit zu haben.

DISCUSSION.

DR. HURTY (Indianapolis) said that he had gone once on a tour of inspection in the country and visited many farm-houses, where he saw whole families living in crowded and unventilated quarters. He asked every one of them if they knew what those conditions meant. All answered in the negative. Education is not the only factor to be taken into consideration: laws should be enacted which will compel the builder to construct houses with the proper amount of air space throughout the dwellings.

DR. WILLIAMS (London) expressed much pleasure in agreeing with Dr. Denison's paper. He stated that ventilation was really the vital thing. However, he does not agree that the trouble lies in the want of electricity in the air, as he does not understand how it increases the oxygen of the air. He also stated that the increase of organic matter had much more to do in the vitiation of the air, against which a good system of purification should be created.

THE PRESENT STATUS OF RAILWAY SANITATION IN THE UNITED STATES.

By H. M. Bracken,
Secretary Minnesota State Board of Health, St. Paul.

It is difficult to define the status of a thing that does not exist. It can safely be said that there is no such thing as railway sanitation in the United States. Sanitary problems relating to railways are, in general, under no special supervision. Judging from my personal knowledge, it would seem possible for a railway company to pay a sanitarian a good salary out of the savings that would result from the advice given by such an appointee relative to the selection for purchase, or non-purchase, of the many so-called sanitary devices and agents thrust upon the market for use in railway cars, etc.

A few years ago the Pullman Company appointed a "Superintendent of Sanitation," and to judge from appearances this company is profiting through the advice of this official. One of the large railway systems has a "consulting sanitarian," but his duties are not well defined and his advice does not seem to be in great demand. In one instance the chief surgeon of a railway system advised that the employment of a sanitarian would be of little if any value to the road which he represented. This same chief surgeon promised to take a deep interest in the sanitary problems of the road, but judging from the progress, or lack of progress, of this road in dealing with sanitary matters during the past few years this chief surgeon must have forgotten his promise. Some railway surgeons do take an interest in advising the roads which they represent to the best of their ability, but, being surgeons rather than sanitarians, their advice is limited to emergencies thrust upon them rather than extended to general problems, which, if properly developed, would not only greatly enhance the comfort and well-being of the traveling public, but would also be of financial benefit to the companies, both directly and indirectly.

Certain railway systems have placed their sanitary problems under the supervision, to some extent at least, of those engaged in the "relief work" of their employees. Quite generally railway sanitary problems are under the control of the "superintendent of motive power" or the "mechanical superintendent."

A few years ago regulations governing the transportation of the dead were

formulated, through the joint action of the American Baggage Agents' Association, the National Funeral Directors' Association, and the Conference of State and Provincial Boards of Health. An effort was made in 1906 by the above conference to take up the question of formulating regulations governing the transportation of the living, and the chairman of the committee appointed for this purpose corresponded with certain railway organizations. Nothing resulted, however, from this effort, the railway representatives appearing to be quite indifferent.

There are interstate regulations relative to the shipping of hogs, cattle, and commercial products, but when the question of national legislation for the protection of human beings is raised, the bugaboo of States rights is brought forward and the proposed legislative measure is promptly killed. In a recent article Dr. C. Harrington* drew attention to the remarkable difference which may exist under conditions fundamentally alike, as relating to States rights, citing as illustrations the fact that while States rights prevented legislation for national quarantine covering a period of about a century, no strong objections were made to the passage of national laws relating to pure food, packing-house products, etc. It would seem, therefore, that while the infringement of States rights is a serious problem when sanitary questions are involved, the question of States rights is easily thrust aside when it interferes with interstate commercial problems—another illustration of the greater value of the dollar than of human life.

There ought to be national regulations bearing upon railway sanitation, but in all probability the formulation of such will be impossible for some time to come. The value of human life does not appeal to the legislator as does the value of commercial products.

Various States have formulated regulations governing railway sanitation, but these are often either tardily or weakly enforced. Among the States having regulations are Kentucky, Georgia, Indiana, Iowa, Kansas, Louisiana, Maryland, Minnesota, Mississippi, Missouri, Montana, New Jersey, North Carolina, North Dakota, Oregon, Rhode Island, Tennessee, Texas, Vermont, Virginia, Washington, and West Virginia (twenty-two). Those admittedly having no regulations are Alabama, Arkansas, California, Colorado, Connecticut, Florida, Illinois, Maine, Massachusetts, Michigan, Nebraska, Nevada, Pennsylvania, New Hampshire, New York, Oklahoma, Ohio, South Carolina, South Dakota (nineteen). Concerning the rest of the States and territories I have not been able to secure any information bearing upon this subject. In the laws and regulations governing these questions in the various States there is the greatest difference.

It may not be quite fair to say that New York and Massachusetts have no such laws or regulations, for in both States there is to some extent pro-

* Oration on State Medicine before the American Medical Association, 1908.

tection of watersheds from pollution by railways. In certain States, such as Ohio, Rhode Island, Vermont, Maryland, Virginia, West Virginia, and Tennessee, the regulations relate only to spitting.

The Tennessee law reads as follows:

"Be it further enacted, That any person or persons who may be proprietors or managers, or any corporation which may be the owner of steam railway passenger coaches operated in this State, shall provide cuspidors or spittoons within said coaches in sufficient number and shall keep the same disinfected and in a sanitary condition to meet the approval of the State Board of Health.

"Be it further enacted, That it shall be unlawful for any one to spit or expectorate upon a wall, floor, or furniture of any steam railway passenger coach, and any person or persons who shall wilfully or carelessly spit or expectorate on said floor, wall or furniture shall be guilty of a misdemeanor and fined not less than two (2) dollars nor more than five (5) dollars for each offense." (From Chap. 594, Acts of 1907.)

The Maryland law reads as follows:

"It shall be unlawful for any person to expectorate or spit on the floors, sides, seats, or platforms of any railroad or railway passenger cars in this State, under a penalty of three (3) dollars and costs, one-half of said fine to go to the informer or party arresting and furnishing the evidence upon which the offender is convicted. And for the purposes of this Section all railroad or railway conductors and brakemen running on passenger trains are empowered to arrest such offenders and take them before the nearest justice of the peace at the next convenient stop of said train within this State for trial, and such justices are given jurisdiction in the case. In default of payment of fine and costs, any party so convicted shall be sentenced to jail for not more than five (5) days; provided, however, that smoking cars in which cuspidors are not placed by the company operating the same shall be exempt from the operation of this section." (Section 238, Article 27, Code of Public Health Laws; passed 1902.)

The Vermont law is as follows:

"If a person shall spit upon the floor or platform, or upon the interior furnishings or furniture, except cuspidors, of any steam railroad, passenger car or street railway car, in operation upon any railroad in this State, or upon the floor, furnishings, registers or radiators, of any railroad passenger station or public waiting-room in this State, he shall be fined not more than ten (10) dollars, to be recovered in a prosecution before any justice of the peace in the county where the offense is committed, provided, however, that no prosecution shall be commenced for such offense unless notice of the provisions of this act shall be posted in a conspicuous place in the cars, station and waiting-rooms of said corporations and suitable cuspidors furnished, excepting in street railway cars." (No. 70, Acts of 1902.)

The laws of West Virginia are as follows:

"That it is hereby declared dangerous to the public health and unlawful, for any person to spit or expectorate or deposit any sputum upon the floor, stairway or upon any part of any theatre, public hall or building where the public congregate or upon the floor of any part of any railroad car or street car or steamboat or any other public conveyance, etc.

"It is further ordered that every railroad or steamboat company, shall provide in each smoking compartment or smoking car as many cuspidors or spittoons as may be necessary for the convenience of passengers. And the managers of every railroad or steamboat operating in the State shall cause all cuspidors or spittoons used therein to be cleansed and disinfected by steam or other approved disinfectant, at least once each day and shall keep not less than one-half ($\frac{1}{2}$) pint of a 5 per cent. solution of carbolic acid in each cuspidor or spittoon.

"No person shall sweep or dust any floor or part of any railroad car, street car or steamboat or other public conveyance while being occupied or used by the public, unless the same has been thoroughly sprinkled with approved disinfectant.

"Within sixty (60) days after the passage of this order, the owners or managers of steamboats, steam and electric railways operated in whole or in part in the State shall post a printed copy of this order in a conspicuous place in each cabin, passenger and baggage car owned or operated by steamboat or railway companies.

"Any person or persons having charge of such railway trains, passenger coach or steamboat, or public or private conveyance, or any other person, who shall refuse to obey such rules and regulations, shall be guilty of a misdemeanor.

"It shall be the duty of the local boards of health, health authorities and health officials, officers of State institutions, police officers, sheriffs, constables and all other officers and employees of the State, or any county, city or village thereof, to enforce the provisions of this order." (An order of the State Board of Health of West Virginia, May 1st, 1908.)

Dr. Foster, of California, under date of June 30, 1908, writes: "Every State should have laws regulating sanitary conditions on railroads with an officer vested with authority to see that such regulations are enforced. . . . . There should be a uniformity of State laws, or, better still, a national law bearing upon this subject."

Dr. Dixon, of Pennsylvania, under date of June 25, 1908, says: "Our department has preferred to exercise its authority in this matter directly through the heads of the great railroad companies, leaving details in their hands. We have conferred authority on the medical officers of railroads to enforce all regulations of the Board regarding general sanitation within the jurisdiction of the several companies. For this purpose we have appointed, for the Pennsylvania railroad, twenty-one of the Medical Officers of the Voluntary Relief Department; for the Philadelphia & Reading railroad, eleven;

and for the Baltimore & Ohio railroad, eighty-eight. The heads of the several departments are given especial commissions, and may be said to represent the authority of this department on those roads and the territories over which they have jurisdiction. Each company makes its own regulations, the only restriction being that they shall be in accordance with the general regulations of the State Health Department."

Dr. Adcock, of Missouri, under date of June 25, 1908, says: "Our Board, at a meeting in March last, promulgated rules and regulations governing the sanitary conditions of railroads and railway stations throughout the State which have been very kindly accepted by the roads. There being no provision by which our Board can appoint some one to look after this matter, the enforcement of the regulations is left to the employees of the railroads. The railroads are not averse to having such instructions from the State Board, as it is to their advantage to have clean cars and day coaches, and in their efforts to keep things clean and sanitary they are glad to have the Board's support."

Dr. Porter, of Florida, under date of June 29, 1908, says: "During the last session of our legislature a bill was prepared to cover railroad and steamship sanitation, but unfortunately the lower house turned the measure down, although the Senate had passed the bill without a dissenting voice."

Minnesota is in much the same position as Missouri and Florida, for it has a set of regulations which it cannot enforce, because during the legislative session the Senate failed to pass a bill covering railway sanitation—regulations which were carefully formulated in conference with representatives of all the railways operating in Minnesota, and therefore presumably practicable. These regulations, which can at present be used only for educational purposes, are as follows:

"No person shall spit upon the floor, furnishings or equipment of any railway coach, chair car, parlor car, sleeping or dining car, depot or depot platform.

"The State Board of Health will furnish, at the expense of the State, upon request, and each railway company operating in the State is hereby required to post and display in each passenger coach, a placard in form as follows:

"*Spitting or Throwing of Refuse on the Floor, Furnishings or Vestibules of this Car is Prohibited by Law.*

"The following notice must be posted in all station waiting-rooms located in Minnesota:

"*Spitting or Throwing of Refuse on the Floor or Furnishings of This Room is Prohibited by Law.*

"1. The notices posted in station waiting-rooms located in Minnesota

must be signed by the Secretary and Executive Officer of the State Board of Health.

"2. The owners of all general waiting-rooms and smoking-rooms shall provide one or more spittoons for each of such rooms. All spittoons must be placed upon the floor. Water must be kept in all spittoons except those used in cars.

"3. Spittoons must be placed in the offices used by railway officials and employees.

"4. Should a passenger be found spitting upon the floor, his or her attention should be drawn to the regulation posted in the car prohibiting spitting. Should it be impossible for the passenger to refrain from spitting because of disease or other infirmity, the porter in charge of the car shall provide such passenger with a spittoon. Each sleeping car operated in Minnesota shall be furnished with one spittoon for each section or compartment. Each smoking compartment in day coaches, chair, parlor, and sleeping cars, must be furnished with at least two spittoons. Each smoking car shall be provided with at least six spittoons. Each combination smoking car shall be provided with at least four spittoons.

"5. Spittoons, as directed in the preceding rules, must conform to the following requirements: They must be of such form as to meet with the approval of the State Board of Health, and so constructed as to conceal their contents from view so far as possible, and permit of their being easily and quickly emptied and cleaned. They must be of such shape that it is easy to spit into them.

"6. Spittoons must be cleaned at least once each day.

"7. When a water-borne disease has developed in epidemic form in a municipality, water from such a place for car tanks must not be used without the approval of the State Board of Health. The drinking-water and ice supply used in day coaches, chair, parlor, dining and sleeping cars must contain no ingredient deleterious to health. In new passenger cars all receptacles for drinking-water must be so constructed that they cannot be opened by any one except those having charge of same.

"Nothing but ice and water shall be placed in the receptacles used for the storage of drinking-water (on cars).

"8. All day coaches must be thoroughly cleaned once each day or at the end of a trip. In no case shall such cleaning be less frequently performed than on every third day. There shall be no dry sweeping or dusting of cars while in service.

"The thorough cleaning of day coaches must be carried out as follows: The floor shall be cleaned with soap and water, to which may be added any other cleansing agent. After being cleaned, the floor shall be mopped with a one per cent. solution of the official formaldehyde solution described by the U. S. Pharmacopœia of 1900, or some other disinfectant approved by the State Board of Health. The walls of the closets shall be cleaned by sweeping and wiping with a disinfecting solution. The hoppers and urinals shall be thoroughly cleaned and disinfected. The floors of the closets shall be thoroughly cleaned. After the above preliminary cleaning, the hoppers and urinals and closet floors shall be mopped with a 1 to 2 per cent. solution of said formaldehyde solution, or some other disinfectant approved by said State Board of Health.

"The receptacles for drinking-water shall be emptied and thoroughly cleaned as often as necessary.

"9. A day coach in which a person affected with smallpox, scarlet fever or diphtheria, has been carried must be closed as soon as the passengers have left the car, and remain closed and unoccupied until the coach has been thoroughly disinfected with formaldehyde gas, using not less than 10 ounces of the said formaldehyde solution for each 1000 cubic feet of space to be disinfected. If the potassium permanganate method is used, then there must be 20 ounces of the said formaldehyde solution, and 16 ounces of potassium permanganate, used for each 1000 cubic feet of space to be disinfected. After a thorough disinfection of the car, it shall be cleaned as directed under Regulation 8."

The cleaning of Pullman or other sleeping cars at terminals is as follows:

"1. The windows, doors and ventilators shall be opened, the upper berths let down, the seat bottoms and backs lifted out, the mattresses, blankets, pillows, curtains, etc., loosely arranged for airing. If the weather permits, the removable articles mentioned above shall be taken out of the car, dusted and aired in the open, and exposed to sunlight for a time. The rest of the cleaning of the car shall be carried out as directed for day coaches under regulation 8.

"2. Sleeping cars shall be fumigated at least once every two months. Fumigation shall be carried out before the carpets have been removed or the cleaning of the car begun. Preparation for fumigation shall be as follows: Close all outside doors, windows, deck sash and ventilators. Arrange one or more windows on each side of the car so that they can be opened from the outside to avoid the necessity of entering the car while the formaldehyde fumes are strong. Open all interior doors. Pull the seats forward and loosen the pillows in the pillow boxes. Open the upper berths and lay the head-boards across the seats so that one corner will rest upon the seat arm. Lay the lower mattresses on the head-boards with the middle arched upwards, the ends being pushed together. Raise the curtain poles and hang the curtains near the end by a single hook. Throw the blankets over the curtain poles, making as few folds or thicknesses of the blanket as possible. Arch the upper mattresses in the upper berths.

"Fumigation with formaldehyde solution and potassium permanganate shall be carried out along the lines approved by the State Board of Health. After the car has been fumigated, it must remain closed for a period of at least three hours, after which time the doors and windows shall be opened as soon as possible. On rainy or damp days the car need not be kept closed after fumigation for a longer period than one hour.

"3. Porters shall not sleep in sleeping cars in Minnesota unless a special compartment in the sleeper and special bedding are provided for their use by the companies operating the same.

"4. Porters shall not use the sleeping car bedding provided for passengers."

The above regulations relating to sleeping cars follow very closely in form the regulations formulated by the Pullman Company for the guidance of its own employees.

"Parlor, buffet and dining cars shall be cleaned each day or at the end of each trip as directed for the cleaning of day coaches under Regulation 8.

"Food boxes, refrigerators, lockers, drawers and cupboards shall be thoroughly cleaned and treated with a 1 per cent. solution of the aforesaid formaldehyde solution as often as necessary, and shall at all times be kept sweet and clean.

"All toilet-rooms, water-closets, urinals and toilet appliances in stations shall be cleaned daily, and when vaults or surface receptacles are used in connection with closets in stations, such vaults or surface receptacles shall receive a daily treatment with fresh lime or other agent approved by the State Board of Health. Toilet-rooms and closets shall be made fly-proof by means of screens on windows or other outside openings."

The Indiana regulations are as follows:

"Day coaches shall be thoroughly cleaned at the end of each trip and in no instance shall a day coach go uncleaned longer than two days. The thorough cleaning of day coaches shall consist as follows: (*a*) Windows and doors shall first be opened and the aisle strip, if there be any, removed from the car: (*b*) all upholstering dusted and brushed; (*c*) floor mopped or swept after it has been sprinkled with water, to which may be added an approved disinfectant; (*d*) after cleaning, as in (*c*), the floor should be scrubbed with soap and water, to which soda ash or like cleansing agent may be added, and after scrubbing, the floor should be mopped with a solution of formaldehyde of one or two per cent. strength or with a solution of other approved disinfectant; (*e*) all arms of seats, panels between windows, window ledges, windows, doors and door knobs shall be washed with soap and water, to which a cleansing agent may be added, and after washing, should be wiped off with an efficient disinfecting solution; (*f*) closet floors and walls shall be cleaned by sweeping and washing and wiping with a disinfecting solution, and urinals and hoppers thoroughly cleaned and disinfected; (*g*) water-coolers shall be frequently emptied, rinsed and scalded, and shall be filled with potable drinking-water when in service; (*h*) and lastly, day coaches shall be disinfected with formaldehyde gas in quantities of not less than 40 fluid ounces of 40 per cent. formaldehyde to each coach at the period of general cleaning and renovation, said period not to exceed ninety (90) days, and also whenever a case of any listed disease is known to have been carried.

"Plush seats and backs shall be removed when possible and dusted by air blast.

"2. Placards shall be displayed in all railway waiting-rooms in Indiana, having plainly displayed thereon the following notice:

"SPITTING ON THE FLOOR IS FORBIDDEN

"Consumption, la grippe, coughs, colds and all diseases of the air-passages are spread by spitting, and these maladies kill 12,000 people annually in Indiana. It is therefore forbidden to spit on the floor. Penalty, five dollars fine.

"It is the duty of train men to warn against violating this health rule. By order of the

"*Indiana State Board of Health.*

"3. Parlor, Buffet, and Dining Cars shall be cleaned at cleaning terminals, as set forth in Rule 1, carpets and draperies to be removed, dusted and sunned and aired, provided meteorological conditions permit. Food boxes, refrigerators, closets, drawers and cupboards to be cleaned, scalded and treated with a 1 or 2 per cent. solution of formaldehyde at least once each week in spring, summer and autumn months, and once every two weeks in winter months.

"4. Suburban, electric and street cars shall be cleaned as follows: (*a*) Windows and doors shall be opened and the aisle strip, if there be any, removed from the car; (*b*) all upholstering dusted and brushed; (*c*) floor mopped or swept after it has been sprinkled with water to which should be added an approved disinfectant; (*d*) after cleaning as in (*c*), the floor should be scrubbed with soap and water to which soda ash or like cleansing agent may be added, and after scrubbing, the floor should be mopped with a solution of formaldehyde of 1 or 2 per cent. strength, or with a solution of other approved disinfectant; (*e*) once each week the arms of seats, panels between windows, window ledges and windows shall be washed with soap and water to which cleansing agents may be added, and after such washing, should be wiped off with an efficient disinfecting solution; (*f*) closet floors and walls shall be cleansed by sweeping, washing and wiping with disinfectant solution every week, and floors of closets, urinals and hoppers shall be thoroughly cleansed and disinfected every day; (*g*) water-coolers shall be frequently emptied, rinsed and scalded, or they may be disinfected with a 2 per cent. solution of formaldehyde, and shall be filled with potable drinking-water when in service; (*h*) electric suburban coaches shall be disinfected with formaldehyde gas in quantities of not less than 20 fluid ounces of 40 per cent. formaldehyde to each coach at the period of general cleaning and renovation, not to exceed ninety days, and also whenever a case of any listed disease is known to have been carried. Plush seats and backs shall be removed when possible, and dusted by air blast. Carpets and mattings are condemned and forbidden in smoking compartments, but rubber aisle strips or linoleum may be used.

"Placards shall be displayed in all waiting-rooms and stations located in towns, villages and cities in Indiana, having plainly displayed thereon the following notice:

"SPITTING ON THE FLOOR IS FORBIDDEN

"Consumption, la grippe, coughs, colds and all diseases of the air-passages are spread by spitting, and these maladies kill 12,000 people annually in Indiana. It is therefore forbidden to spit on the floor. Penalty, five dollars fine.

"It is the duty of train men to warn against violating this health rule. By order of the

"*Indiana State Board of Health.*

"5. Conductors and brakemen in charge of steam trains, and conductors and motormen in charge of suburban electric and street cars, shall pay proper attention to ventilation, and shall promptly reprove and warn all persons who spit on the floor or otherwise befoul the car in which they are riding. They shall also inquire concerning any case of sickness which they may notice, and determine as best they can whether or not it is a listed disease,

and if found or suspected to be listed, the health officer at the next stop may be appealed to for the purpose of caring for the case as seems best.

"6. Sleeping Cars. Upon arrival at cleaning terminals, sleeping cars shall be cleaned as follows: (*a*) Windows, doors and ventilators opened; (*b*) upper berths let down, seat bottoms lifted off, and mattresses, blankets, pillows and curtains, etc., loosely displayed for airing, and, provided the weather will permit, all the articles named shall be aired outside the car; (*c*) carpets, rugs and portieres shall be removed from the cars, weather permitting, and dusted and aired in the open, otherwise the work shall be done as best can be in the wide opened car; (*d*) after cleaning, the floor should be scrubbed with soap and water to which soda ash or like cleansing agent may be added, and after scrubbing, the floor should be mopped with a solution of formaldehyde of one or two per cent. strength, or with a solution of other approved disinfectant; (*e*) all windows and woodwork shall be thoroughly cleaned with approved detergents and carefully wiped; (*f*) closets, spittoons and toilet arrangements shall be thoroughly cleaned and disinfected with an approved disinfectant every day; (*g*) sleeping cars shall be disinfected at least once a month in an approved manner with formaldehyde gas, as set forth in (*h*) of Rule 1, and shall also be disinfected if at any time it is known that a person with a listed infectious disease has been carried. Pullman conductors and porters shall see to it that as good ventilation as is possible is always maintained.

"7. The listed diseases are declared to be: Smallpox, diphtheria, scarlet fever, erysipelas and measles. All common carriers and their employees are forbidden to knowingly carry any person afflicted with the above named diseases.

"RECOMMENDATIONS

"It is recommended that conductors and brakemen be supplied with pocket paper pads having the following notice printed on each slip:

"*Health Notice.*

"Spitting on the floor is forbidden. It is filthy, makes a nuisance and is contrary to law. All diseases of the lungs and air-passages, also certain other diseases, are spread by dried spit. Over 12,000 people die annually in Indiana from 'spit diseases' caught from spitters. Not less than 200,000 cases of sickness are caused thereby in Indiana annually. Spitting on the floors and sidewalks must stop. Ladies do not spit. Gentlemen will not spit.

"*Indiana State Board of Health.*

"Conductors and brakemen should hand these slips to spitters. They may also be handed to passengers who are not spitters. Persistence in this matter will surely lessen the spitting evil. This will make traveling more pleasant and so encourage travel. Car cleaning will also be made less expensive.

"*Disinfection.*

"The best and cheapest disinfection for cars and rooms may be accomplished in the following way: Close all openings, and for each 1000 cubic

feet use 6½ ounces of permanganate potassium and one pint of 40 per cent. solution of formaldehyde. Place the permanganate in a large tin dish pan or any like vessel, then pour the formaldehyde solution upon it. The formaldehyde gas will be quickly set free and will penetrate plush, curtains, carpets and all parts of the car or room, causing complete disinfection. The rapid disengagement of the gas is an important point, and this method further commends itself because no fire or apparatus is required."

The Kentucky regulations are as follows:

"All day coaches engaged in regular traffic shall be thoroughly cleansed after each trip at such points as facilities for same have been provided. In no case shall such cleansing be less frequently performed than every third day of use. In such cleansing, all rugs, mattings and upholstered seats and back rests, when practicable, shall be removed from the coach to the open air for mechanical cleansing, and be exposed to sunlight when the prevailing meteorological conditions will permit.

"2. All interior surfaces in coaches are to be mopped, scrubbed or cleansed, at intervals of not more than ten days, with solutions of mercury bichloride, carbolic acid, tricresol or other disinfecting preparation preferred by any corporation and approved by this Board as to ingredients and strength.

"3. Spittoons are to be provided in numbers of not less than one for each seat in all smoking cars and toilet-rooms, and one at each end of all other day coaches and in all waiting-rooms. Placards provided by this Board shall be displayed at each end of all such coaches, and in all waiting-rooms, indicating the importance of using the spittoons, and it shall be a violation of these rules for any person to spit upon the floor, or platform, of any railway car, or other public conveyance, or upon the floor of any waiting-room or platform in any station or depot.

"4. All coaches of any kind in which an acute infectious disease has been carried shall remain closed and unoccupied after such person has been removed until it has been thoroughly cleansed and disinfected by the use of formaldehyde gas in quantities of not less than 40 fluid ounces of formalin to each coach. All day coaches in regular use for through travel are to be disinfected after cleansing, by some method approved by this Board, at intervals of not more than ten days.

"5. All toilet-rooms, water-closets, urinals, spittoons and toilet appliances are to be scrubbed with soap and hot water and disinfected with formalin, or other approved method, after each trip's use, and kept as clean as possible when on the road, and all similar rooms and appliances in stations shall be cleaned daily in the same way, and when vaults or surface receptacles are used in stations these shall be disinfected daily with fresh lime.

"6. All preceding regulations in regard to cleanliness and disinfection shall apply equally to sleeping, dining, buffet and parlor cars used in the service of the public.

"7. All blankets, curtains and hangings used in sleeping cars shall be exposed to superheated steam or other means of disinfection, approved by this Board, at intervals of not more than ten days, and all mattresses shall be treated at intervals of not more than sixty days.

"8. In each sleeping car there shall be carried spittoons of any sufficiently

sanitary type, meeting the approval of this Board, which shall, upon the occupancy of any upper berth, be placed therein by the car attendant, whose duty shall also be to notify the occupant of its readiness for use. Owners of sleeping cars must provide proper supports and buckets for such spittoons.

"9. No railway or sleeping car company operating cars within the limits of this State shall permit, and no porter or other employee shall sweep any such cars while en route or occupied by passengers, or shall brush or dust the clothing or belongings of passengers in the aisles or body of the cars while so occupied."

The Texas regulations are as follows:

"Employees of railway companies shall pay proper attention to ventilation, and shall promptly warn all persons who spit on the floor or otherwise befoul the car in which they are riding. They shall also inquire concerning any case of sickness which they may notice, and determine as best they can whether it is a contagious or infectious disease, and if found to be such, the health officer at the next stop may be appealed to for the purpose of caring for the disease as seems best.

"2. Each day coach used for passengers in this State shall be provided with one cuspidor for each seat or every two chairs, and one in each smoking apartment; except that in each parlor car there shall be as few as one cuspidor to every three seats and two cuspidors used in the smoking apartment; in each sleeping car shall be placed one cuspidor to each section and three cuspidors in the smoking apartment, one of which cuspidors shall be an unusually large one placed near the wash basin for use in washing the teeth; each cuspidor in every car used for passengers shall contain not less than one-third of a pint of an approved disinfectant solution, and the cuspidors shall be emptied, washed in a similar solution, and replenished each trip or every twenty-four hours.

"3. Day coaches shall be thoroughly cleaned at the end of each trip, and in no instance shall the day coach go uncleaned longer than two days when such coach is in use; the thorough cleaning of day coaches shall consist as follows: (*a*) Windows and doors shall be first opened and the aisle strip, if there be any, removed from the car; (*b*) all upholstery shall be dusted and brushed, using compressed air whenever possible; (*c*) the floor shall be mopped or swept after it has been sprinkled with an approved disinfectant solution; and after cleaning thus, the floor must be scrubbed with soap and water, to which soda ash or like cleansing agent might be added. (It is preferable to sprinkle the floor with sawdust saturated with an approved disinfectant before sweeping.) (*d*) Closet floors and walls must be cleaned by sweeping, and washing and wiping with an approved disinfectant solution, and urinals must be thoroughly cleaned and disinfected with same; (*e*) all arms of seats, panels between windows and window ledges, windows, doors and door knobs must be washed with soap and water to which a cleansing agent may be added; (*f*) water coolers must be emptied and scalded once in each twenty-four hours, and shall be filled with good and wholesome drinking water when in service.

"4. Sweeping is prohibited while train is in transit unless floor of car is sprinkled with sawdust wet with an approved disinfectant solutionton thoroughly keep down the dust.

"5. Parlor, buffet and dining cars must be cleansed at cleaning terminals as set forth in Rule 3. Carpets and draperies to be removed, dusted, sunned and aired. Food boxes, refrigerators, closets, drawers and cupboards to be cleansed, scalded and treated with a solution containing 2 per cent. absolute formaldehyde or such other disinfectant as the State Health Officer may approve.

"6. Day coaches must be thoroughly disinfected in the manner described in Appendix A, or by such other method as the State Health Officer may approve, immediately after any case of contagious or infectious disease, as defined in Appendix C, is discovered on board of said day coach, and also every day coach must be disinfected by said method on being sent to the repair shop for any cause, and before same is readmitted to service.

"7. Every sleeping coach operated in the State of Texas shall be cleaned at cleaning terminals according to the methods set forth in Rule 3, at least once each week; and must be disinfected at least twice each week, except coaches which are used in a continuous trip for more than three days and such should be disinfected at the end of each run, and in no instance shall such a coach be used for more than eight days without disinfection. Said disinfection shall be done according to the method described in Appendix A, or by such other method as the State Health Officer shall approve; and all blankets used in sleeping cars must be thoroughly washed at least every ninety days.

"8. Every day coach, parlor, dining or sleeping car operated within this State shall be provided with adequate and efficient appliances and equipment for ventilation, and it shall be the duty of the owners, operators and employees, to provide the best possible ventilation at all times that the said car is in use.

"9. Ice which is used in water-coolers in cars must not be dumped on floors, sidewalks, car platforms, where people have trod and expectorated, and then picked up by unclean hands and but into the drinking-water. It must be washed, and handled with ice tongs.

"10. Passengers, patrons, employees and others are prohibited from washing their teeth or expectorating in basins in sleeping cars or passenger coaches in this State, and near the wash-basins in each coach shall be conspicuously posted placards with the following inscription printed thereon: 'Passengers and employees are prohibited, by the laws of Texas, from washing their teeth and expectorating in wash-basins.'

"Large cuspidors shall be provided for such purposes as indicated in Rule 2.

"11. On each sleeping car operated in the State of Texas a fumigation record must be kept and preserved, and on same the following records are to be entered and kept, viz.,

"1. Date of each disinfection.

"2. Length of time devoted to each such thorough disinfection.

"3. Each item in said record shall be inserted immediately after each act recorded, and the signature of the person or persons doing said cleaning or disinfection must appear beneath the said records."

"*Appendix A.* The method of disinfection recommended by the State Health Officer (of Texas) is as follows: Use 6½ ounces potassium permangan-

ate and one pint U. S. P. solution formaldehyde for each 1000 cubic feet of space in the room. Sprinkle the floor with water before beginning, so as to render the atmosphere moist—the chemicals act better. Be sure no fire or open flame is in the room. Seal all cracks around doors and windows with strips of paper. Unfold all blankets and other kinds of clothing, and separate the mattresses, so that fumes can penetrate. Place the permanganate crystals in a jar or galvanized iron bucket, using at least a two-gallon bucket for one pound of crystals. Set this container in a tub, with a couple of bricks intervening. Place the tub in the middle of the room. When all is ready, pour the formaldehyde solution quickly into the bucket containing the permanganate crystals, and beat a hasty retreat, closing the door immediately. If any other method of disinfection is preferred by any individual, the State Health Officer will be glad to approve same, after satisfying himself that the desired method is the equivalent of the above method."*

"*Appendix C.* In these regulations wherever the words 'infectious or contagious diseases' occur, they shall be construed to mean any of the following diseases: Smallpox, diphtheria, scarlet fever or scarlatina, dengue or breakbone fever, yellow fever, tuberculosis or consumption, bubonic plague, Asiatic cholera, leprosy, trachoma, typhoid fever, cerebrospinal fever (epidemic), epidemic dysentery, measles, mumps, German measles (rötheln), whooping-cough and chicken-pox."

In July, 1908, Montana adopted regulations relating to car sanitation quite similar to those in Minnesota.

Iowa has certain special regulations which read as follows:

"(1) All railway passenger cars operated or used in this State, or occupied by passengers while in transit through the State, shall be fitted with water-closets and urinals so constructed as to properly disinfect discharges deposited therein before such discharges are removed or allowed to escape from the car.

"(2) Any manager or agent of a railway company neglecting to comply with the provisions of this rule, or any employee or other person allowing such discharges to escape from the proper receptacle without proper disinfection as herein provided, shall be deemed to have violated the rules and regulations of the State Board of Health and shall be prosecuted accordingly."

Kansas has no regulations of its own, but the regulations quite generally followed throughout the state are those embodied in a circular issued by the Union Pacific Railway Company, of which Dr. A. F. Jonas (Omaha) is Chief Surgeon.

The laws of New Jersey provide that: "The State Board of Health shall have a right to cause a sanitary inspection to be made of all chattels and persons in transportation through the State, and of the cars, boats and other vehicles in which such chattels or persons may be transported, and the said Board shall have the same right of inspection, procedure and con-

* The quantity of potassium permanganate required by the Texas and Indiana regulations is not sufficient under the Minnesota regulations.

trol in this respect as is or may be conferred by law upon the local board of health or local authorities in any township or city, or other local municipal government in this State, and when in the judgment of said Board it may be necessary, the said Board may require or cause an examination of vessels, cars, boats or other vehicles and of all baggage and persons, to be made, and may enforce such detention or disinfection as they may deem necessary for the public safety." (Approved March 31, 1887.)

This law is supplemented by an act approved April 14, 1903, relative to spitting, which reads as follows:

"Any person who shall expectorate or spit on the floor, side, seat or platform of any railroad or railway passenger car in this State, shall be deemed and adjudged to be a disorderly person; provided, that nothing herein contained shall apply to smoking cars or compartments of cars where smoking is permitted when said smoking cars or smoking compartments are not provided with cuspidors."

North Carolina passed a law in 1907 which reads as follows:

"That every person or railroad company, whether incorporated or not, engaged in the regular business of carrying passengers on its railroad cars in this State, shall have the passenger cars on their roads cleaned, brushed and dusted and the windows washed, if needed, at least once each day, and have in each car, in which male and female passengers are carried therein, a toilet-room for each sex, and have the same kept clean.

"2. Any person or corporation engaged in the business described in Section 1 of this act who shall wilfully or negligently fail or refuse to give orders to their agent or agents in charge of such cars and comply with the requirements of this act shall forfeit twenty dollars for each day that it refuses, to be recovered by any person suing for said penalty."

Mississippi has regulations which read as follows:

"Each day coach used for passengers for smoking must be provided with one cuspidor for each seat. Each day coach used for lady passengers must be provided with at least six cuspidors. Cuspidors to be emptied and cleaned thoroughly at the end of each trip or every twenty-four hours. This rule shall not apply to parlor cars, except that cuspidors must be provided for the smoking compartments.

"2. The floors of all cars may be swept in transit, provided it is first thoroughly sprinkled with water to prevent raising dust. If it be desired to remove rubbish or trash with broom and dust pan from portions of the car while in transit, sprinkling will not be necessary. Dusting of cars with a brush is prohibited, but it may be removed from walls and seats with a cloth.

"3. Containers of water for drinking in cars must be emptied and thoroughly cleansed at the end of each trip.

"4. Ice which is used in water-cooler in cars, must not be dumped on floors, sidewalks or car platforms where people have trod and expectorated. It should be handled with ice tongs to place it in the coolers.

"4. All persons are prohibited from spitting upon the floors of cars.

"6. Day coaches used for passengers must be fumigated whenever the necessity exists, at some point in this State acceptable to this Department.

"If a car becomes infected by being occupied by a person having a contagious disease, it must be disinfected immediately at the end of run.

"7. All persons must be prohibited from washing their teeth over or expectorating into basins which are used for bathing face and hands in passenger coaches. Large cuspidors should be provided for such purposes.

"8. All water closets in railway coaches must be kept well flushed with water and must be cleaned as often as necessary."

Mississippi has regulations governing sanitation in railway sleeping cars which read as follows:

"Each sleeping car used for passengers must be provided with at least one cuspidor for each section or compartment; cuspidors to be emptied and cleaned thoroughly at the end of each trip, or every twenty-four hours.

"2. The floors of all cars may be swept in transit, provided that it is first thoroughly sprinkled with water to prevent raising dust. If it be desired to remove rubbish or trash with broom and dust pan from portions of the car while in transit, sprinkling will not be necessary. Dusting of cars with a brush is prohibited, but it may be removed from walls and seats with a cloth.

"3. Containers of water for drinking in cars must be emptied and thoroughly cleansed at the end of each trip.

"4. Ice, which is used in water-coolers in cars, must not be dumped on floors, sidewalks or car platforms, where people have trod and expectorated. It should be handled with ice tongs to place it in the coolers.

"5. All persons are prohibited from spitting upon the floors of cars.

"6. All sleeping cars must be disinfected in a manner approved by this Department at the end of each third round trip, where the cars do not leave the State of Mississippi.

"Sleeping cars leaving the State are to be fumigated every second trip, where the trips are of not more than four days' duration, and every trip, if of longer than four days' duration, and every third trip, if only one-night run.

"Sleeping cars crossing the State are to be fumigated each round trip of six or eight days' duration, and at the end of each single trip where round trip is of more than eight days' duration.

"All carpets, curtains, blankets and bedding, except linen, to be disinfected with cars.

"*Provided,* That when any sleeping car is known to carry a case of infectious or communicable disease, it must be fumigated at the end of that trip, or it may be disconnected from train and fumigated at any station if required by this Department.

"7. All sleeping cars must be thoroughly cleansed at the end of each trip.

"8. In the event that sleeping cars passing through the State are not fumigated at terminals outside of the State, as required in Rule 6, they will be required to stop at some point inside of the State of Mississippi, approved by this Department, for fumigation.

"9. All persons must be prohibited from washing their teeth over or ex-

pectorating into the basins which are used for bathing face and hands in sleeping cars. Large cuspidors should be used for such purposes."

The Mississippi regulations governing sanitation of depots are as follows:

"Depots and public buildings must be provided with not less than one cuspidor for each room or hall, which must be emptied and cleansed once every twenty-four hours. This applies to rooms and halls in daily use.

"2. All depots and public buildings must be disinfected by fumigation whenever the necessity exists for it.

"3. Containers of water for drinking in depots and public buildings must be emptied and thoroughly cleansed at least once every forty-eight hours.

"4. The floors of depots and public buildings must be sprinkled with water before each sweeping, and must be kept clean.

"5. All water-closets in depots must be kept well flushed with water, and must be cleansed and disinfected as often as necessary."

The foregoing rules were put into force in Mississippi November 1, 1907.

Louisiana has regulations which read as follows:

"Each passenger coach or sleeping car used for passengers must be provided with one cuspidor for each seat or every two chairs. Each cuspidor must contain not less than six ounces of a disinfectant solution approved by the State Board of Health. The cuspidors must be emptied, washed in a similar solution and replenished each trip, or every twenty-four hours.

"Day coaches shall be thoroughly cleaned at the end of each trip and in no instance shall a day coach go uncleaned longer than two days. The thorough cleaning of a day coach shall consist as follows:

"Windows and doors shall be first opened and the aisle strip, if there be any, removed from the car.

"All upholstering dusted and brushed.

"Floor mopped or swept, after it has been sprinkled with a solution containing 8 per cent. absolute formaldehyde or other disinfectant, as approved by the State Board of Health, or preferably cleaned by sprinkling with sawdust, moistened with said formula, and sweeping. After cleaning, as prescribed in the foregoing part of the present paragraph, the floor must be scrubbed with soap and water.

"Closet floors and walls must be cleaned by sweeping and washing and wiping with a solution of formaldehyde as described above, or such other disinfectant as the State Board of Health may approve, and urinals must be thoroughly cleaned and disinfected with same or similar solution.

"All arms of seats, panels between windows and window ledges, windows, doors and door knobs must be washed with soap and water, to which a cleansing agent may be added.

"Water-coolers must be emptied and scalded once in each twenty-four hours, and shall be filled with good and wholesome water when in service.

"All upholstered seats must be covered with clean linen and changed at the end of every run.

"Day coaches must be thoroughly disinfected in the manner described in the bulletin on disinfection at least once every quarter, and immediately

after any case of contagious or infectious disease has been discovered and removed.

"Every sleeping coach operated in the State of Louisiana must be disinfected at the end of each run, and in no case must any sleeping coach be used for a period of time longer than one week without being disinfected. Said disinfection must be done in the manner prescribed in the bulletin on disinfection.

"Ice which is used in water-coolers in cars must not be dumped on floors, sidewalks or car platforms. It must be washed, and handled with ice tongs.

"Brushing of teeth and expectorating in basins used for lavatory purposes is prohibited, and placards calling attention of passengers and employees shall be hung in a conspicuous place in the dressing-rooms of passenger coaches.

"Employees of railway companies shall pay proper attention to ventilation, and shall promptly warn all persons who spit on the floor or otherwise befoul the car in which they are riding. Brushing of passengers' clothing and hats in coaches is prohibited.

"Parlor, buffet and dining cars must be cleansed at cleaning terminals as already set forth in these regulations. Carpets and draperies to be removed, dusted, sunned and aired. Food boxes, refrigerators, closets, drawers and cupboards to be cleansed, scalded and treated with a solution containing 2 per cent. of absolute formaldehyde, or such other disinfectant as the State Health Officer may approve.

"On each sleeping car operated in this State, a log book, permanently bound, must be kept and preserved, and in this log book the following records are to be entered and kept, viz.,

"1. Date of each disinfection.

"2. Detailed method of disinfection.

"3. Date of each thorough cleansing.

"4. Length of time devoted to each such thorough cleaning.

"5. When and where the linen covers for upholstered chairs were changed.

"6. Each item in said record shall be inserted immediately after each act recorded, and the signatures of the person or persons, doing said cleaning or disinfection, must appear beneath the said records in the form of a note, as follows:"

While Oklahoma has as yet reported no regulations relating to car sanitation, it has already, through its Attorney-General, brought action against one of the railroad systems operated in the State to restrain it from sweeping cars in transit while carrying passengers therein.

The railroads throughout the country have regulations relating to car cleaning, etc., quite similar to some of the State Board of Health regulations, and some State sanitary authorities depend upon these.

I have not quoted these State regulations to show their value, but rather to show how little has been accomplished by sanitary authorities in matters pertaining to car sanitation and how inefficient those formulated are. Railroads have very few trains that start and finish in any one State, hence a

single State seldom has control of any one train throughout its entire journey. Railway sanitation is therefore an interstate problem, and must be dealt with as such. It might be possible for State sanitary authorities in conference or through a committee, and acting in conjunction with practical railroad operators, to formulate certain regulations that would be applicable to the entire country; but such regulations would only have the force of law after having been put into effect through the legislature of each and every State. Even then there could be no uniformity in the enforcing of such regulations. There should be federal legislation covering these points, as there now is covering other interstate problems.

Railway sanitary problems may be enumerated as follows:

1. *Stations*—construction, lighting, ventilation, toilet accommodations; construction and care of station platforms, care of station surroundings, *i. e.*, approaches, shipping pens, etc.

2. *Cars*—ventilation, protection from smoke and dust, toilet accommodations, water-supply, car cleaning, etc.

3. *Prevention of disease*—exposure in cars, care of cars, policing of stations, etc.

The station is not a source of great danger so far as the spreading of disease is concerned. Still there are important sanitary problems in connection with these buildings. During a recent trip of inspection I visited several stations where it was necessary in midday to strike a light in order that I might note the condition of the floors in the toilet-rooms. Of course, such rooms were often dirty, partly due to the fact that passengers using them were careless, and partly because those having charge of such dark rooms did not consider it necessary to free them of the dirt that was concealed by the darkness. These conditions were primarily due to the inexcusable negligence of the architects who designed the stations, for in most instances the toilet-rooms were against the outside wall of the building (as they should have been), but the windows were too small, or too high up in the wall, or darkened by artistic overhanging roofs or by stained glass used in their construction. In the men's toilet-rooms the closet seats were often unfit for use, and the odors from these rooms had free access into the men's waiting-rooms. Such conditions brought to the attention of the proper railway officials should insure to the architect responsible for such construction the loss of any further work for that company.

Not enough attention is given to the cleansing of toilet-rooms.

It is a fact that the ordinary station waiting-room is unattractive the year around. In winter it is stuffy and ill-smelling, often due in part to the condition of the closets referred to above. In the summer it is the home of flies. It follows that in winter or summer the passenger who has to wait for any considerable time at such a station is restless, and, if an able-bodied

man or woman, is constantly going out of the room for a change of air, or a rest from the annoying flies. It follows that travelers are irritable under such conditions, and the criticisms passed upon the road are intensified by the unsanitary conditions in the station.

More attention should be given to the cleanliness of stations. Not long ago, while waiting in a well-built station located in a city with a population of 10,000, a porter came into the room, which was dirty with the refuse and lunches of the previous day, and began dry-sweeping with a long-handled brush. Of course, the dust raised was unbearable, and the only thing to do for those who were waiting in the room was to go out and promenade on the platform, for there were no outside seats. This room should have been swept the night before, or early in the morning before passengers began to use it. It should not have been dry-swept at any time.

The appearance of the grounds about a station may not be of great sanitary importance, but a station having for its environment a green lawn, a few shrubs, and an occasional flower has a great advantage from a sanitary point of view over an ill-kept place, for the loafers who so frequently assemble about stations are less disposed to indulge their filthy habits about a well-kept place. Railway station esthetics, civic pride, and improved sanitary surroundings are very apt to go hand in hand.

Spitting in or about stations should be prohibited, for there is a possibility of infection where dried sputum accumulates.

The proper care of the day coach is important. Such coach is by many considered a great disseminator of tuberculosis, but this is probably based on mistaken ideas. It certainly is an open question whether tuberculous infection ever takes place because of tubercle bacilli in a coach. This fact may as well be frankly recognized. Nevertheless, the foul air and lack of ventilation in the ordinary day coach, during the winter time especially, may produce an irritation and congestion of the respiratory tract that may result in a cold, and favor a tuberculous implantation that otherwise would not have occurred. There is no question but that improved sanitation in the railway coach, on the city trolley car, and on the suburban car is badly needed. I do not believe there are more than two railway systems in the United States that have their day coaches properly ventilated. The ventilation of trolley cars is notoriously bad.

The question of spitting on car floors is often discussed, and the use of the cuspidor advocated. The spitting habit is disgusting, and should be controlled by police supervision if necessary. The use of the cuspidor in the day coach of American cars as they are now constructed is hardly practicable. It is quite difficult to spit into a cuspidor placed between seats unless the seats are arranged vis-à-vis, thus giving the spitter room. Of course, the cuspidor cannot be tolerated in the aisle of the car. Many of

the regulations recorded in this paper call for the carrying of cuspidors on day coaches in order to supply the passengers who really need them. I am inclined to think that it would be far more practicable and economical for the railway company to supply such passengers with individual spit-cups rather than with the cuspidor.

It will hardly do to say that there is no danger of contracting tuberculosis on the American day coach, for there certainly is a possibility of receiving local if not general infection from the use of common drinking-cups and tumblers, and I am strongly of the opinion that these possible sources of infection should be abolished from all cars.

Not long ago I saw a woman traveling with her husband in a sleeping car—a man far advanced with pulmonary tuberculosis—use the glass belonging on the car for this man to drink from. Incidentally, I may say that she slept in the same berth (lower) with this patient, the windows closed, and this in August. If this woman does not die of tuberculosis, it will not be due to any precautions taken by her against infection; as she was an intelligent looking woman she should have known enough to carry an individual drinking-cup for this man.

The cuspidor in the American smoking coach is not practicable with the seating arranged as at present. It is to be hoped that in the near future railway officials may be persuaded to place the seats of smoking coaches on the side, with possibly four sections in the middle with seats vis-à-vis, as is frequently done in some of the cars now used for city and suburban traffic. The argument that the side seat is not so comfortable as the one facing the engine is a poor one. Even admitting that it is not quite so comfortable, the advantages to be gained by such a system of seating far outweigh the disadvantages of posture. There are but few passengers who make long journeys in the smoker, and those unfortunates who have to so travel can easily secure the seats in the middle of the car after a time. It should be noted that the library and observation cars so generally used at the present time on our best trains force the passengers to sit with the back to the outside wall of the car. True, they are seated in chairs, but the smoking car with side seats can be provided with division arms which will make each seat almost as comfortable as a chair and at the same time prevent one passenger from using more space than he has paid for. The argument is often made by the railway people that the seating capacity of the car arranged as suggested above would be reduced over that of the present method. This is not true to any appreciable degree, and in fact amounts to absolutely nothing when we take into account that, with the side seat, a passenger can occupy but one seat, while with the present method of seating a passenger in the majority of cases occupies two and sometimes four seats.

It is time to make a protest against the style of cuspidor generally used

on cars in this country. There are two prevailing types: (1) the iron cuspidor with weighted base to keep it from tipping over, and contracted neck to keep the contents from spilling out; and (2) the small cuspidor with sides sloping upward toward the center, making the top smaller than the bottom—the cuspidor so generally used in the sleeping cars. The first of these is but rarely if ever well cleaned. The second is hard to spit into, and if missed in part the expectorate is apt to lodge on the side of the cuspidor, later to be wiped off by the clothing of travelers. A cuspidor should not be so high as to be easily upset and the top should have a greater diameter than the bottom. It should be so constructed as to be easily opened and cleaned. Such cuspidors are required on certain European railways. The Pullman company—one of the chief offenders—might be excused for a sufficient length of time to permit it to use up its old stock of ill-shaped cuspidors, but it should be required to have all new cuspidors made of proper form and construction.

If smoking cars were properly seated, a sufficient number of good-sized cuspidors could be placed in each car, and there would then be no excuse for making the car so filthy as is often the case under present conditions.

Much has been said about the dangers of contracting tuberculosis in sleeping cars. Without question there is some danger, but this has probably been overestimated. The danger of local (skin) infection is probably greater than that of pulmonary infection. There is, however, a sentimental objection to too close association with the tuberculous, and this is not easily overcome. In fact, it is a question whether we should wish to overcome it, for it is better that people should be too careful than not careful enough.

The points that need attention in the Pullman car, in addition to that of the cuspidor, are the bedding, the ventilation of the berth when made up, the use of the wash-basin for teeth-cleaning, the use of common drinking-glasses, etc. Theoretically, the danger from the blankets has been diminished by the use of a third sheet as a counterpane, but practically this third sheet is of little, if any, protective value. The sleeping berth is generally made up with two blankets for covers. This is too much for the ordinary sleeper at all times, and the result is that one or both blankets are thrown back. To throw off one or both blankets necessitates the throwing back of the third or upper sheet. It thereupon ceases to afford any protection from the blankets. A long upper sheet to turn back over the blankets at the top is far better than the third sheet.

The lack of ventilation in the lower berth when made up is simply beyond description. This can and should be corrected. It will undoubtedly mean

a change in car construction, but this can and should be met from this time on in all new cars.

Arrangements should be made so that it might be possible to clean one's teeth without spitting into the basins provided for lavatory purposes. This question is now being considered, I believe, by those interested in the construction of the Pullman cars.

The common drinking-glass or cup should be abolished from all cars. Every passenger on the Pullman cars at least should be required to carry his own drinking-cup.

All closets on cars are thus far defective, not only because they require the disposal of excreta along the railway track, but also because with present construction they must be closed for considerable periods when trains are passing through cities, thus greatly inconveniencing travelers. The danger from excreta along a railway is often ridiculed by railway officials, but when we consider the actual amount thus deposited and put in motion by moving trains we must concede, I think, that there is a real danger. Bearing upon the possibility of infection from excreta, let me quote the following*: "In the year 1905 there were sold in the United States 700,000,000 railway tickets, and these tickets called for 2,000,000,000 miles of travel. As there are approximately 200,000 miles of railway in this country, this would average about 30 miles per ticket, or 90,000 persons per annum over each mile of railway in use. If each passenger excreted on an average from the intestines one-half pound a day and of urine 50 ounces, we would have deposited on the narrow rail strip 45,000 pounds, or 22½ tons of human excrement and 4,500,000 ounces of urine, for there is at present no contrivance to carry these to a point where they may be incinerated or disinfected. These excreta are deposited on a strip of ground 5 feet 7 inches wide, there allowed to dry, and later thrown into the air by the rapid motion of cars."

One State Board of Health has by regulation ordered that all cars shall be fitted with water-closets and urinals so constructed as to permit of proper disinfection of discharges deposited therein before such discharges are allowed to escape from the car. This is simply absurd at the present time, for with any system of closet now in use in the United States the disinfection of stools cannot be carried out on any train. It is time for some inventive genius to devise some means of carrying excreta on cars.

One great trouble in dealing with railway sanitation in the past has been due to the lack of harmonious action between the railway operators and sanitarians. The sanitarian knows what is theoretically wanted, but he has no workshop in which to work out his ideas. The railway company has the workshop, but it practically refuses to use it for working out the

*From Michigan Public Health, Sept., 1906, p. 44.

sanitarian's ideas, although such ideas might finally be of great commercial value to the company. Too often the railway operators satisfy themselves by simply saying that the sanitarian's ideas are impracticable, or possibly by referring the matter to some chief surgeon who knows nothing of sanitation outside of the operating room. It is unfortunate indeed that railway officials cannot appreciate the importance of sanitarians in railway work. When the time comes that such appreciation is shown, then the comfort as well as the safety of passengers will be conserved and the railway company will profit thereby even in a financial way.

Finally, as to diseases contracted in cars: Some of the dangers can hardly be avoided, for there are constantly travelers suffering from smallpox, scarlet fever, diphtheria, measles, whooping-cough, influenza, etc., on trains. We must simply take our chances in such matters. These passengers may be ignorant or indifferent as to their true condition.

Let us trust that in the near future sanitarians may be recognized as a necessary part of the operating force dicussion of a railway company.

DISCUSSION.

Dr. Crowder, Superintendent of Sanitation of the Pullman Car Company, said that railroad sanitation does not exist at the present time, except in certain quarters, because of lack of uniformity of the health laws of the various States through which the Pullman cars travel. State boards of health should make it a practice to consult with the railroad companies as to the reason why certain things constitute dangers, and the practical means of executing measures directed against unsanitary conditions. Dr. Crowder described the measures adopted and enforced by the Pullman Company, which are designed to comply with the demands of the boards of health in the States over which their cars travel. The Pullman cars must be disinfected at least once a month; every car which has carried a visibly sick person is disinfected at the end of the trip. If such a sick person has vacated a berth en route, the car must be disinfected at the end of the trip. Cars that make long transcontinental trips are disinfected at the end of the trip. He described in detail the new ventilating system, the new cuspidor, and the new basin designed to obviate the evils associated with cleansing the teeth.

Dr. J. N. Hurty (Indianapolis) said that he was not so much concerned about railroad sanitation as he used to be, because we all had seen the wonderful development of the Pullman Company, which made closets and wash-rooms very good. It has been found advisable to do away with carpets, and the Pullman Company has replaced these with a material more sanitary and durable. It is very difficult to find a material to replace plush

in the car seats. The ventilation of upper berths is very defective. A new device is being tested on some roads. This is a duct which will provide plenty of air. Dr. Hurty said that not long ago he found himself traveling with several presidents of important railroad lines, who, in discussing the matter of sanitation, expressed the opinion that it was very difficult to realize ideal conditions in a Pullman car, for the reason that many factors had to be taken into consideration in a "house on wheels" traveling at a speed of forty miles an hour.

What can a railroad company do to the passenger who expectorates on the floor or soils the seats with eggs and jam? In a particular station there are fourteen trains in and out. They had to be ventilated according to the only system that is now in use, through the deck of the car. They came to the terminals in a filthy condition. When ventilation is well carried out, there are always passengers who prefer to breathe foul air, and they object to the ventilation.

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

EIGHTH SESSION.

Friday Morning, October 2, 1908.

STATISTICS OF TUBERCULOSIS.

Section VI was called to order by Dr. Edwards Liceaga, of Mexico, honorary president of the Section, on Friday morning, October 2d, at half-past nine o'clock.

COLLECTION OF STATISTICS OF TUBERCULOSIS.

By Dr. Cressy L. Wilbur,

Chief Statistician, Bureau of the Census, Washington.

"We may decry statistics as much as we like, but when we see the effects of a disease set down in cold columns of black and white, we have no longer any idea of submitting to it as inevitable. We are going to get right up and do some fighting."—Dr. Woods Hutchinson, "Tuberculosis, a Scotched Snake," in "Saturday Evening Post," September 19, 1908.

Statistics hold within themselves the history of the past, the guidance of the present, and the prophecy of the future of sanitation. Modern public hygiene has been evolved from the studies based upon vital statistics, and the dawn of the present era of national, State, and municipal sanitary improvement immediately followed the institution of official systems of registration of births and deaths. In America sanitary work has possibly outstripped the progress of registration of vital statistics; yet we may doubt the soundness of that development of public health work that is not based upon, and intimately correlated with, dependable vital statistics. As Dr. John S.

Fulton, the Secretary-General of the International Congress on Tuberculosis, has forcibly said: "Public hygiene is built upon, is controlled and directed by, and is everlastingly in debt to vital statistics. . . . Every wheel that turns in the service of public health must be belted to this shaft, otherwise preventive medicine must remain invertebrate and unable to realize the profits available from the magnificent offering of collateral sciences." This is just as true in the public health work for the prevention of tuberculosis as in any other class of public health work, and it is with the plea that practical sanitary efforts against tuberculosis, and against all other preventable diseases as well, may no longer remain "invertebrate" in the United States, or in a very large portion of the United States, that I come before you to urge the collection of vital statistics, and the collection of better vital statistics, as the most efficient and fundamental means of aiding in the prevention of tuberculosis in this country.

In the pamphlet on "Tuberculosis in the United States" which I had the honor of preparing on behalf of the Bureau of the Census for distribution to the International Congress on Tuberculosis, I have endeavored to bring out some of the most important facts relating to the mortality from tuberculosis in the United States as collected by the decennial censuses from 1850 to 1900, and as published in the annual reports on mortality statistics from 1900 to the present time. Also—and I presume it may startle some members of this Congress who are not aware of the backward condition of the United States in this important function of government as compared with other civilized nations—I have attempted to point out the pressing necessity, from the practical sanitary point of view alone, of the extension of adequate methods of registration of vital statistics over the entire area of the United States. Partial and incomplete statistics should not be tolerated by a country which should stand in the forefront of progress in the protection of the lives and health of its citizens, for which purpose it is universally admitted by all competent sanitary authorities such statistics are indispensably necessary. In the conservation of national resources, to which attention has only lately been directed by President Roosevelt, there is none which has been more needlessly squandered than that of the people themselves. "The State has no material resources at all comparable with its citizens, and no hope of perpetuity except in the intelligence and integrity of its people."* Is it not worth while to record the births and deaths of the inhabitants of the United States? And when, in addition to the legal and personal importance of such records, it is admitted that the resulting vital statistics are of indispensable sanitary usefulness, it would seem that the people of the United States need only realize their present condition in this respect in order to remedy it. To bring about such a realization may be one of the important services to

* Catalogue of Ohio State University, quoted by Collier's, August 29, 1908.

be rendered by this International Congress, in whose exhibits the great usefulness of the vital statistics collected by other nations to their practical work in the prevention of tuberculosis may be clearly seen.

I have little interest in statistics as mere statistics—as dead figures—apart from their practical usefulness as guides to work. Some of you were perhaps amused by a clever caricature in a recent issue of "Puck" in which a framed motto appears upon the wall: "What is Home Without Statistics?" Statistics are not intended for light reading in the home, as a rule, although many a bright magazine article is practically a statistical exposition; but how many a home has been wrecked by the loss of the husband and father or wife and mother, or saddened by the untimely deaths of children, from preventable diseases, chief among which is tuberculosis, whom a little attention to the teachings of vital statistics, and the employment of modern methods of public hygiene based upon vital statistics, would have saved? For people will not spend money and time to prevent disease until they realize the importance of so doing, and this cannot be shown until deaths and the causes of deaths and sickness are properly registered and the results of such registration are statistically compiled for the use of the people and their sanitary servants.

One of the most important services of vital statistics to the "State and Municipal Control of Tuberculosis" with which this Section is concerned is to present reliable statements of the exact amount of tuberculosis present, in all of its various forms, in the area subject to preventive work; to trace its progress, whether increasing or decreasing, and how affected by the various methods of restriction that may be employed; and to compile the data whose comparison with facts relating to climate, housing, occupation, medical treatment, establishment of dispensaries and sanatoriums, etc., may suggest better means or conditions for the prevention of sickness and deaths from this disease. The comparison of the mortality from tuberculosis with that of other important diseases indicates at once the preëminent need for tuberculosis prevention because it is the most frequent cause of death in most of the countries of the world. The fact that the death-rate from tuberculosis has been constantly and rapidly decreasing for many years past, as shown for England and Wales and Massachusetts in the colored diagram contained in the census pamphlet, and also, by what figures are available, for the registration area of the United States, fills us with hope for the future, and perhaps may lead us to expect the total suppression of this disease within the lifetime of children now living. If the curve representing the death-rate in Massachusetts from all forms of tuberculosis be produced according to the rate of decrease shown from 1881 to 1906, it will intersect the base-line of the future at the point of *no deaths* about the year 1935; and the curves for England and Wales and the United States (registration area) will arrive at the disap-

pearance of the disease some ten years later. But it should be remembered, on the one hand, that a curve approaching its limiting line may show a decreasing rate and amount of decrease; and, on the other hand, that the organized warfare against tuberculosis throughout the world, of which this International Congress on Tuberculosis is only a beginning, ought to insure more rapid progress than ever before in the suppression of this disease. The statistics warn us, while they encourage us with the knowledge that tuberculosis has long been declining under ordinary sanitary means, not to attribute a mere continuance of such ordinary decrease to the special measures of restriction now coming into vogue. Moreover, the statistics of some countries do not indicate a decreased mortality from tuberculosis such as characterizes those of England and Massachusetts, and it would be a mistake to predict the time for the final extermination of tuberculosis from the results obtained under the most favorable circumstances.

The collection of statistics of tuberculosis, and of other diseases, is of value not only for the statistics collected and their practical sanitary uses, but it is essential as a mode of sanitary administration. The knowledge obtained is important, and the process of obtaining that knowledge brings the sanitary administrator into intimate touch with the physicians attending the sick, the nurses, families, friends, and neighbors concerned, enables instruction to be given to them, and permits immediate and direct action to be directed by the health officer to the exact place and at the exact time when it is likely to be most effective. This is because the collection of statistics of tuberculosis means ever and always the immediate registration of sickness and deaths from tuberculosis. By immediate registration of sickness is meant prompt notification of the occurrence of the disease as soon as it comes to the knowledge of the attending physician, followed up by such additional reports during the progress of the disease as may be required, and completed by a final report on the termination of the disease in recovery or death. By immediate registration of deaths is meant their registration within a short time after their occurrence, and before the bodies of the deceased persons are disposed of by interment, cremation, or otherwise, or removed from the registration unit of area in which the death occurred. This object can only be attained, as experience has conclusively demonstrated in the United States, through the rigid requirement of a burial or removal permit, issued by the local registrar to the undertaker or other person disposing of the body, and without which no body of a dead human being is allowed to be interred or removed under penalty. We should have, then:

(*a*) Registration (notification) of all cases of tuberculosis.

(*b*) Registration of all deaths from tuberculosis.

The problem of registration of sickness and deaths varies in complexity according to the extent of the area embraced and the possible conflict or

interference of legislation, as depending upon national, State, or municipal authority. We have to consider—

1. National registration of tuberculosis:
   (*a*) Sickness.
   (*b*) Deaths.
2. State registration of tuberculosis:
   (*a*) Sickness.
   (*b*) Deaths.
3. Municipal registration of tuberculosis:
   (*a*) Sickness.
   (*b*) Deaths.

Now in the United States there is not, and it is assumed that there never can be under the present limitations of the Constitution, a direct registration of sickness and deaths by the general government. The enumeration of deaths and sickness, as by census enumerators at the time of the taking of the decennial census of population, is in no sense registration, and the method should no longer be continued. It follows that the national statistics of the United States are dependent upon the collection of proper data by the State or city registration authorities, and it is an important part of the present work of the Bureau of the Census to aid in the extension of the "registration area," from which satisfactory vital statistics may be derived.

The principal source of mortality and morbidity statistics must be the registration States, and the enactment and enforcement of uniform and effective registration laws for all of the States of the Union is the first and most urgent requirement for obtaining adequate national statistics of tuberculosis. We are fortunate in that this phase of the subject has been thoroughly studied from a practical standpoint, and we know definitely just what kind of a law will give good results in actual operation for the registration of deaths, and just what provisions will prove futile and prevent success. There is no need of further experimenting with a voluntary or semi-voluntary system, supposed to be enforced without penalties and depending upon the belief that physicians or undertakers can be led to make returns directly to a State or county officer. There is no need of considering for a moment any plan of obtaining returns of births or deaths through any county officer (county clerk, county health officer, judge of probate, etc.); this plan has been thoroughly tried in many States and the results have invariably been worthless. There is no need of planning to enumerate births and deaths, by supervisors or assessors, at the end of the registration year; this is the old and now discarded census method of 1850, but was adopted again, as late as 1906, in Iowa for births. There is no hope of success if adequate provision for the necessary expenses of the administration of a registration law—which are but moderate—are not provided, or if there is no efficient execu-

tive officer—not a mere political time-server—to see that the law is uniformly and effectively executed throughout the State. The positive requirements of successful registration of deaths were summarized by a committee of the American Public Health Association in coöperation with the Bureau of the Census in 1901, have since been applied to the drafting of laws in force in many States, and have recently been affirmed as rules of statistical practice by the Association at its meeting at Winnipeg, August, 1908:

ESSENTIAL REQUIREMENTS FOR REGISTRATION OF DEATHS.

1. Deaths must be registered immediately after their occurrence.
2. Certificates of death of standard form should be used.
3. *Burial or removal permits* are essential to the enforcement of the law.
4. Efficient local registrars are necessary.
5. The responsibility for reporting deaths to the local registrar should be placed upon the undertaker or other person having charge of the disposition of the body.
6. The Central Registration Office should have full control of the local machinery, and its rules should have the effect of law.
7. The transmission and preservation of returns should be provided for.
8. Penalties should be provided and enforced.

A model bill for the registration of births and deaths has been prepared on the plan of similar measures recommended by the Bureau of the Census, and has been approved by the House of Delegates of the American Medical Association and by the American Public Health Association. It will be submitted to the legislatures of the various non-registration States, with the coöperation of their sanitary authorities, and it is possible, with the success of the laws already enacted or soon to be passed, that the United States will have nearly two-thirds of its territory under the operation of such legislation by 1910, the year of the next decennial census. But the registration of sickness from tuberculosis (or other diseases) is in a much more backward condition, and presents inherent difficulties which prevent this very necessary part of sanitary administration from even being undertaken in many States. In fact, nowhere in the United States or in the world are morbidity statistics collected with the precision with which mortality statistics are obtained in many States and countries.

The reason for this condition, at least in the United States, would seem to lie in the fact that there is no general agreement, such as exists for the registration of deaths, as to the necessary methods of procedure, or even as to the essential principles that should be observed in framing such legislation. It is largely a matter of haphazard experiment, is undertaken for only a limited list of diseases and chiefly for municipalities, and the law is usually but very imperfectly enforced. Pains are not taken to check up returns

with the mortality records and prosecute cases of delinquency. It follows that the results in various areas are of very unequal value and therefore not comparable; neither can any reliable deductions of fatality or case rate be made. It would seem also that it is unreasonable to expect success in the registration of sickness from tuberculosis in States or cities where the deaths themselves are not registered. Upon the latter we have an absolute check—the burial permit—and can know whether all deaths are or are not recorded. It is not probable that a State or city that neglects this elementary requirement will secure useful data in a kind of registration much more difficult to enforce. It follows that the first and absolutely necessary step before attempting to institute a system of registration of sickness from tuberculosis is to install an effective system for the registration of all deaths, if no such system exists. Such a procedure will render complete sickness reports possible after the profession and the people have been sufficiently educated to its importance and trained to obey the law for the registration of deaths. It is futile to expect even approximately complete returns of sickness when the deaths themselves are not recorded, as is the case in a large portion of the United States. Hence the most effective action that could be taken by the International Congress on Tuberculosis and by its members in the United States at the present time, with a view to the ultimate complete notification of sickness from tuberculosis—an indispensable aid in the warfare against this disease—is to advocate and work for the extension of the registration area for deaths until the entire United States is included therein. Such action is recommended in the proposed draft of resolutions which may be found upon page 43 of the census pamphlet on "Tuberculosis in the United States":

A. Indispensable Importance of Registration of Sickness and Deaths from Tuberculosis.

1. The registration of sickness and deaths from tuberculosis is of indispensable importance to a sanitary administration which undertakes to combat this disease, and the registration (notification) of sickness from tuberculosis should be of special benefit to the tuberculous sick, to their medical attendants, and to their families and friends. For its full value, especially for administrative and statistical purposes, such registration ought to be complete; and it should be considered a paramount duty by legislators, sanitary officials, the medical profession, and the press and public, to bring about such complete and effective registration of all deaths and sickness from tuberculosis.

2. The first step, in the United States, must be to secure the proper registration of all deaths, from whatever cause; the registration of deaths from tuberculosis is merely a part, although a very important one, of the general problem. It is useless to attempt adequate registration of sickness when deaths are not registered. The organized efforts and coöperation of the American Medical Association, the American Public Health Association, the

Conference of Commissioners on Uniform State Laws, the United States Public Health and Marine-Hospital Service, and the United States Bureau of the Census, to secure the adoption and enforcement of adequate laws for the proper registration of deaths and the extension of the registration area of the United States, are, therefore, most cordially commended by the Congress on Tuberculosis as affording the first and absolutely indispensable means for the control and suppression of tuberculosis in this country, and all who are interested in the movement for its control are earnestly requested to help to secure the necessary legislation, and to support it when secured and to seek to educate public sentiment on this subject, to the end that the United States may attain a complete and uniform system of registration.

Prompt notification of illness from tuberculosis and the complete statistics of morbidity based thereon must be recognized as of paramount importance to sanitary administration and the prevention and control of the disease. It is the object at which we should aim in making the registration bureau of the greatest value to the general work of the public health office in connection with tuberculosis. It is of particular importance to the welfare of the tubercular sick. For the individual the accounts are closed when it comes to the mortality statistics. The logical mode of procedure is first to secure the complete registration of all deaths, and then to build upon the foundation of complete mortality statistics the superstructure of complete registration of cases of tuberculosis (and other diseases). Any other plan is sure to be attended with complete or partial failure, and will only help to swell the mass of worthless and unreliable "statistics" that now perplex and annoy the sanitary inquirer.

It is not necessary to give much attention to the third subdivision, municipal registration of sickness and deaths. The same principles should govern, namely, first to secure complete registration of deaths, then add the notification of sickness enforced through the agency of the mortality returns. Municipal registration is chiefly valuable in the absence of an effective State law. It is far preferable to have a general law in operation for the entire State area, and whose results are thus perfectly comparable for all cities in the State. On the other hand, where general State laws are out of the question, a beginning of a State system of registration, both for deaths and sickness, must be made in the cities. It is desirable that such municipal systems should merge in the general State system as soon as that can be constituted, or at least that they should be thoroughly harmonized and correlated with it.

The Medical Certification and Statistical Compilation of Deaths from Tuberculosis.—Assuming that we possess a fairly satisfactory system for the registration of all deaths, including deaths from the various forms of tuberculosis, and that to this has been added a system of prompt notification of cases of tuberculosis, it is a matter of no small importance that reports of tubercu-

losis as made by the attending physicians upon morbidity returns or upon certificates of death shall be of a precise and definite character, and that the compilation of such data shall be made according to a uniform plan, so that all official statistics of tuberculosis shall be comparable. The chief forms of tuberculosis ought to be presented according to a predetermined list which shall be best adapted to bring out the important clinical distinctions of the disease, and be most serviceable to the practical sanitary official. Such statistics should be internationally comparable, so that we may see clearly just what forms of tuberculosis most prevail in certain countries, be able to know the exact condition of the world to-day, so far as mortality and morbidity statistics are registered, and also be able to trace the course of tuberculosis in each country from the beginning of its system of registration.

Tuberculosis is the most important of all diseases, from the standpoint of sanitary restriction, among the highly civilized peoples of the temperate zone, and it is therefore surprising that there should not be readily accessible and thoroughly comparable statistics of its mortality. Yet in the Sixty-ninth Annual Report of the Registrar-General of England, published in 1908, under the head of International Vital Statistics, he is compelled to say of tuberculosis and cancer:

Pulmonary Tuberculosis and Cancer.—Disregarding *possible variations* in the methods of classification of the deaths, as well as the age and sex constitution of the populations, it is possible to make a rough comparison among several countries, as regards the relative incidence of mortality from these two important diseases. *Several States* (countries) *were unable to furnish complete returns of mortality from phthisis* or from cancer. For example, no comparison can be instituted as regards France, Denmark, Sweden, or Bulgaria, as the statistics of those countries are limited to towns only; again in Hungary and in Prussia the returns comprise deaths from all forms of tuberculosis, while in Italy deaths from general tuberculosis are included under pulmonary tuberculosis.

I have indicated by italics in the above text some of the astonishing statements in regard to the imperfection of the official national statistics concerning this most important disease. There were only ten European countries that furnished comparable returns. The Registrar-General summarizes the indications derived from the statistics available as follows: "In England and Wales, in Scotland, and in five European countries, viz., the German Empire, the Netherlands, Belgium, Norway, and Italy, a diminution in the death-rate from this disease has taken place in recent years; on the other hand, the death-rate in the Austrian Empire, in Servia, and in Ireland is abnormally high, and shows no general tendency to decrease." Yet in the pamphlet on "The Struggle against Tuberculosis in Sweden," issued by the Swedish Government for the International Congress on Tuberculosis at Washington,

1908 (page 28), it is stated that: "The general death-rate here in Sweden, as in other civilized countries, has enormously decreased during the last decade. . . . Meanwhile the mortality due to consumption has everywhere remained almost stationary, our own country not excepted, as the accompanying curve diagram shows."

It is surely of the utmost importance to those engaged in the warfare against tuberculosis to know, with all of the certainty of correct official statistics from all of the progressive countries of the world, whether tuberculosis is increasing or not, and the fact that authoritative statements in this connection are based upon limited sources of information (only ten countries in Europe!) or may be entirely contradictory, shows the pressing necessity for more complete and more thoroughly comparable international statistics of causes of death. The United States is very backward in registration matters, but it would seem that the other countries of the world are not very far in advance as regards the practical utilization of the data collected.

The reason for this failure in the comparability of international statistics of causes of death lies in the lack of agreement, until very recent times, among the nations of the world, as to the adoption of an international system of classification. Until 1900 all countries employed their individual systems, among which are many and perplexing differences, although the most eminent statisticians, and especially Dr. William Farr, of England, labored unceasingly in the early days of official registration of vital statistics to promote international coöperation and agreement. In 1900 an International Commission was held at Paris upon the invitation of the French government, and in pursuance of a recommendation originally made by the American Public Health Association and approved by the International Statistical Institute, in which delegates of twenty-six countries participated. The result of the labors of this Commission is known as the International Classification of Diseases and Causes of Death, and is now in actual use, according to a statement lately received from Dr. Jacques Bertillon, the secretary-general, in twenty-two countries of the world. It was adopted by the United Stated Census among the very first (statistics of the census year ending in 1900), and the last country to be added was the new commonwealth of Australia, where it is now in satisfactory use. The second decennial revision will be held at Paris next year (1909), having been advanced a year at the request of the United States, so that the results will be ready in time for use in connection with the census of 1910. Special committees appointed by the American Medical Association and the American Public Health Association are now coöperating with the medical services of the government (army, navy, public health, and marine hospital service) and with the Bureau of the Census in preparing suggestions for the improvement of the system, to the end that the revised classification which will soon go into use for the

next ten years may be of the highest scientific value and give the most useful information for those engaged in public health work, and especially to the workers against tuberculosis. Upon the thoroughness with which this work of revision is done at the present time largely depends the value of our statistical data for the next ten years, and it is surely a matter of the most pressing moment to all members of this Congress on Tuberculosis that the classification of the different forms of tuberculosis shall be in the best and most convenient manner for their use throughout the world. It is so important that I believe that a special committee of the Congress ought to be constituted for this purpose, and also with reference to the obtaining of any necessary changes in the systems in use in countries that have not adopted the international classification, so that we may have at least some thoroughly comparable international statistics of tuberculosis from all countries. I therefore present the following draft of resolutions:

B. Necessity for Uniform Statistical Classification and Accurate Reporting of Tuberculosis.

1. All statistics of tuberculosis, whether national, State, or municipal, and also statistics of hospitals and institutions, should be thoroughly comparable, both for the statistics of sickness and of deaths. Physicians should confine themselves to the accepted terms of the standard classification, and doubtful reports ("possibly tuberculous") should be systematically investigated by sanitary and registration authorities. A penalty should be provided for false statements intended to conceal the presence of tuberculosis, the making of which should be considered a matter of professional and personal dishonor; and all legal requirements relative to insurance and other matters tending to falsification of official statements of causes of illness or death should be held contrary to public policy.

2. The Congress on Tuberculosis should endeavor to secure the adoption in all statistical classifications of a standard classification of tuberculosis, and for this purpose should appoint a committee to consider the various forms now in use and to present its recommendations to the International Commission for the Revision of the International Classification of Causes of Death and Sickness, which meets in 1909, and also to the registration authorities of the governments employing other systems of classification, to the end that as soon as possible a uniform classification of tuberculosis may be used by all of the countries of the world.

Colección de Estadisticas de Tuberculosis.—(Wilbur.)

El registro de los enfermos y muertos de tuberculosis es un paso esencial en la inspección de la enfermedad por el Estado y el municipio. Estos datos son de valor para un administrador de sanidad, desde el punto de la estadística, y como una guída para la institución de las medidas pro-

filácticas. No debe atenerse incompletas estadísticas, que una incompleta es peor que inutil. El registro exacto de los casos es de mucho mayor valor que el registro de las muertes, pero es extremadamente dificil de realizar, y no puede esperarse cuando las muertes mismas no se recojen. El Congreso de Tuberculosis debe recomendar organizados esfuerzos para su recolección y esto debe ser apoyado por sus miembros el los Estados Unidos, y se ofrece una resolución á este efecto. Se urge el apoyo de la Clasificación Internacionas de las enfermedades para asegurar estadísiticas comparables. Se aboga por la formación de un modelo de clasificación de tuberculosis por una comisión que presentaría sus recomendaciones á la comisión Internacional para la Revisión de la Clasificación de las causas de enfermedad y muerte, y se presenta una resolución á este fin. Los médicos profesionales deben aducarse para que presenten, y el pueblo para que pida la verdad de los casos de tuberculosis, y consecuentemente el dejar de informar su existencia debe considerarse como un acto deshonroso profesional.

Collection de statistiques de la tuberculose.—(WILBUR.)

La declaration des cas de maladies et de morts par la tuberculose est un point essentiel pour le contrôle de la maladie par l'Etat et la municipalité. Ces chiffres sont d'une grande valeur pour un administrateur des Bureaux de Santé au point de vue statistique et comme guide pour prendre des mesures prophylactiques. Les statistiques toutefois doivent être complètes, car les statistiques imparfaites sont non seulement inutiles mais nuisibles. Une declaration exacte des cas est de bien plus grande valeur que l'enregistrement des morts, mais il est très difficile d'obtenir le premier et on ne peut même pas s'attentre à l'obtenir, quand les cas de morts eux-mêmes ne sont pas déclarés. Le Congrès de la Tuberculose devrait recommander de faire des efforts organisés pour les recueillir, et les membres de ce Congrès aux États-Unis devraient supporter ces efforts. L'auteur présente ici une résolution à cet effet. Il demande aussi du Congrès d'approuver la classification internationale des maladies pour obtenir des statistiques comparable. Il est en faveur de la nomination d'un comité pour formuler une classification modèle de la tuberculose, et ce comité devrait présenter ses recommandations à la Commission Internationale pour la Révision de la Classification Internationale des causes de maladie et de mort; une résolution est présentée ici à cet effet. La profession médicale devrait apprendre la necessité de dire et le public la nécessité de demander la vérité sur les cas de tuberculose qui se présentent, et par suite l'omission d'en déclarer un cas devrait être considérée un acte professional déshonorant.

Sammlung von Statistiken über Tuberkulose.—(WILBUR.)

Die Registrirung der Erkrankungen und Todesfälle von Tuberkulose ist ein inhaltsreicher Schritt in der staatlichen und städtischen Kontrolle der Krankheit. Diese Daten sind von Wert für einen Sanitätsbeamten von einem statistischen Standpunkte und als Führer in der Einrichtung prophylaktischer Massnahmen. Irgend etwas weniger als vollständige Statistiken sollte nicht angestrebt werden, da unvollständige schlechter noch als nutzlos wären. Genaue Registrirung der Erkrankungen ist von viel grösserem Werte als die der Todesfälle, aber ausserordentlich schwer durchzuführen, und kann nicht erwartet werden, wenn die Todesfälle selbst nicht verzeichnet werden. Gesammt-Anstrengungen, sie zu sammeln, sollten durch den Tuberkulose-Kongress anempfohlen und durch seine Mitglieder in den Vereinigten Staaten unterstützt werden, und diesem Zwecke entsprechend ist ein Vorschlag gemacht worden.

Eine Zustimmung zur internationalen Classification der Krankheiten durch den Kongress wird verlangt, um vergleichbare Statistiken zu sichern. Die Formulirung einer massgebenden Classification der Tuberkulose durch ein Comite ist befürwortet, welche ihre Vorschläge der Internationalen Commission zur Classifizirung der Krankheiten und Todesfälle unterbreiten sollte und eine Resolution zu diesem Zwecke ist vorgelegt. Die Angehörigen des ärztlichen Berufes sollten ihre Aufmerksamkeit dahin richten, die Wahrheit in Bezug auf das Vorkommen der Tuberkulose zu gestehen und das Volk sollte diese Wahrheit verlangen; infolgedessen sollte ein Unterlassen, ihr Vorkommen zu berichten, als eine unehrenhafte berufliche Handlung angesehen werden.

CONSUMPTION AND VITAL STATISTICS.

By Dr. Chas. A. Hodgetts,
Health Officer, Ontario, Canada.

The selection of the title of this brief paper may seem somewhat out of place, but the word "consumption" has been chosen in preference to that of "tuberculosis" for a purpose which will be apparent.

The application of statistics to tuberculosis must of necessity be largely confined to its mortality until such time as legislatures require a confidential notification of each and every case of the disease to health authorities, and then it is very questionable if anything but approximate morbidity figures will be obtainable, even if a considerable statutory fee is provided as compensation for professional information which primarily is the property of the patient and to acquire which the State or municipality should give compensation.

In the search of mortality statistics of tuberculosis in Ontario, where the registration of vital statistics has been in operation since 1869, one interesting feature has been brought out—which is the subject of this paper.

Naturally, as statisticians, we must rely upon the medical practitioner for the information as to the exact cause of death in each and every instance. It is our duty simply to collate this medical data, which are of value as they are accurate; and any error as regards their application must therefore rest with the individual creator of each and every notice of death. In other words, if statistics lie as to the mortality of "consumption," the sin is not one of the statistician, but of those who furnish the certificates of death, viz., the members of the medical profession.

That such is undoubtedly the case is not set forth as an axiom by the writer. The reader is left to make his own deductions after a consideration of the mortality returns of the Province of Ontario for a period of thirty-five years.

In Table I will be found the census population, total number of deaths from tuberculosis in all forms, and percentage increase or decrease from year to year. In Table II are shown the total number of deaths from all causes for each of the years from 1876 to 1906 inclusive, census population for the decennial periods, together with annual death-rate per 1000 of population.

In the year 1876 the mortality returns were more nearly accurate than in

preceding years, and in the same year the reported deaths from tuberculosis were 2315—a figure approaching that of the yearly average for the next twenty years (1876 to 1895 inclusive), viz., 2247—and during these two decades it will be noticed the variations and fluctuations were only such as might naturally be expected.

In the year 1896 there evidently began an upward tendency in the deaths from all causes, which has continued year by year ever since (Table II), although it will be noticed by reference to the census population that the increase has been nothing abnormal—indeed, not what it should have been in such a Province as Ontario, into which there has been an influx of immigrant population. It will be noted that with the increase in total mortality there was a corresponding increase in the mortality from tuberculosis for the four years 1897 to 1900, inclusive; but in 1901 and 1902 the decline in the deaths from tuberculosis was very noticeable—790 in two years—being more marked than at any other time in the periods given, the deaths from tuberculosis in the latter year being only 27 in excess of those for the year 1883, at which time the population was a quarter of a million less than in 1902.

Since that year the total number of deaths from all causes has shown a yearly increase, the maximum being in the year 1906, when the total was 32,782. While the deaths from tuberculosis show a slight yearly increase for the corresponding period, they have not reached the figures of 1900, when the maximum of 3484 occurred.

It is quite evident the people are dying in increasing numbers, but those reported under the head of tuberculosis are marked lower than in the years 1895 to 1900, and, reasoning from the mortality statistics, Ontario should be congratulated upon the marked improvement in the apparently rapid decline of consumption as a cause of mortality.

The yearly percentage increase or decrease of the deaths from tuberculosis is shown in Table I. An analysis shows that the maximum yearly increase was 11.3 per cent. in the year 1881, and the maximum decrease 17.9 per cent. in the year 1902.

A comparison of the Ontario returns with those of the Registrar-General of England and Wales as found in the Annual Report, 1903, is most interesting. Here the maximum increase was 6.4 per cent. in the year 1890, and the maximum decrease 7.04 per cent. in the year 1896. (See Table III.)

While in Scotland, quoting from the Registrar-General's Report, 1903, the maximum increase was 9.8 per cent. in the year 1895, and the maximum decrease 9.3 per cent. in the year 1896 in the case of tuberculosis, while for phthisis, which is here tabulated separately, the maximum increase was 8.1 per cent. in 1895 and the maximum decrease 10.3 in 1896. (See Table IV.)

Judging by the standard of these two countries, it may safely be taken that the variation in tuberculosis mortality is within the ranges indicated

in Tables III and IV, and at no time has it paralleled that of Ontario in respect to so sudden and so marked a decline as is shown in Table II.

If tuberculosis were of the group of communicable diseases in which we look for exacerbations in the mortality rate due to increased mortality or marked virulence in some outbreak as compared with others, then we would expect to find just such a condition as is shown to have been the case here. It would appear that, with the exceptions here noted, the fluctuations in mortality have a fairly constant range.

To fully account for this sudden decline may indeed be difficult, and the following remarks are offered simply in part as an explanation.

About the year 1895 greater attention was drawn to the subject of the white plague in Ontario, and all classes became interested. The medical profession showed greater accuracy in the diagnosis of cases, and, as a result, death returns were more correct. The truth prevailed as it was acceptable. Then followed a reaction.

The bearing it had upon those seeking life insurance was soon felt, for family history was carefully considered. The public in part came to look upon the consumptive as a modern leper, only fit for segregation in an institution. Consumption, the "white plague," was the modern "bloody hand" upon the family escutcheon. And the sufferer therefrom found it difficult to secure employment in factory, office, or workshop, and such often being wage-earners, their families suffered in consequence. Now the truth was not acceptable; and, as a consequence, a marked decrease in the mortality from tuberculosis in the years 1901 and 1902 occurred, notwithstanding the continued yearly increase in the deaths from all causes.

By reference to the chart it will be observed that a slight reaction is to be noted for the years 1903 and 1906 inclusive, showing a gradual rise in the mortality of tuberculosis. It is quite evident that some controlling influence prevents the true effects of this disease being known as a factor in our mortality statistics. Certain it is the people die at a higher rate in Ontario year by year (Table I).

In looking for an improvement in the mortality statistics as far as the province to which I refer is concerned, it requires a higher and better education in all that appertains to consumption and all forms of tuberculosis, for when once the public and the medical profession are fully seized of the truths respecting cause, spread, control, and cure, and all are possessed with an honest desire to assist in its suppression—then, and only then, will mortality statistics in regard thereto be accurate.

There must be no juggling of figures in the interest of any particular institution or class of work instituted for the care and treatment of consumptives, for there is no one specific, but there are many ways, opportunities, and means by which alone the desired goal of suppression can be reached.

TABLE I.

SHOWING THE YEARLY PERCENTAGE, INCREASE AND DECREASE IN DEATHS FROM TUBERCULOSIS IN THE PROVINCE OF ONTARIO FOR THE YEARS 1876–1906 INCLUSIVE.

YEAR.	DEATHS.	INCREASE.	DECREASE.	YEAR.	DEATHS.	INCREASE.	DECREASE.
1876	2315	..	..	1891	2379	..	4.9
1877	2188	..	5.9	1892	2592	8.9	..
1878	2053	..	6.1	1893	2552	..	1.5
1879	2104	2.4	..	1894	2379	..	6.7
1880	2197	4.4	..	1895	2472	3.9	..
1881	2446	11.3	..	1896	2922	1.8	..
1882	2591	6.4	..	1897	3164	8.2	..
1883	2667	2.9	..	1898	3291	4.01	..
1884	2506	..	6.0	1899	3405	3.4	..
1885	2499	..	0.27	1900	3484	2.3	..
1886	2573	2.9	..	1901	3284	..	5.8
1887	2556	..	0.66	1902	2694	..	17.9
1888	2551	..	0.19	1903	2723	1.1	..
1889	2417	..	5.2	1904	2877	5.6	..
1890	2503	3.5	..	1905	2667	..	7.3
				1906	2911	9.1	..

POPULATION FOR CENSUS YEARS.

1881	1,923,610
1891	2,122,716
1901	2,184,144

TABLE II.

SHOWING THE NUMBER OF DEATHS FROM ALL CAUSES WITH POPULATION AT CENSUS PERIODS IN THE PROVINCE OF ONTARIO; ALSO DEATH-RATE PER 1000 OF POPULATION FOR THE YEARS 1876–1906 INCLUSIVE.

YEAR.	CENSUS POPULATION.	NUMBER.	PER CENT.	YEAR.	CENSUS POPULATION.	NUMBER.	PER CENT.
1876	..	18,623	10.0	1892	..	23,120	10.7
1877	..	20,053	11.1	1893	..	22,903	10.6
1878	..	17,808	9.3	1894	..	22,538	10.3
1879	..	17,958	9.6	1895	..	22,461	10.1
1880	..	19,802	15.0	1896	..	24,857	10.9
1881	1,923,228	22,821	11.8	1897	..	27,633	12.2
1882	..	21,800	11.3	1898	..	26,370	11.5
1883	..	21,049	10.9	1899	..	28,607	12.4
1884	..	21,702	11.2	1900	..	29,494	12.6
1885	..	22,105	11.4	1901	2,182 947	29,608	13.6
1886	..	23,184	11.0	1902	..	27,864	12.6
1887	..	23,414	11.5	1903	..	29,664	13.4
1888	..	23,734	11.0	1904	..	31,290	14.1
1889	..	23,329	10.7	1905	..	31,371	14.2
1890	..	24,013	11.1	1906	..	32,782	14.8
1891	2,114,321	21,558	10.2				

TABLE III.

DEATHS IN ENGLAND AND WALES FROM TUBERCULOSIS IN ALL FORMS, SHOWING INCREASE AND DECREASE PER CENT. (SIXTY-SIXTH ANNUAL REPORT, 1903.)

YEAR.	DEATHS.	INCREASE.	DECREASE.	YEAR.	DEATHS.	INCREASE.	DECREASE.
1884.....	69,482	..	..	1894.....	59,363	..	6.9
1885.....	66,221	..	4.6	1895.....	62,777	5.7	..
1886.....	68,148	2.9	..	1896.....	58,357	..	7.04
1887.....	63,596	..	6.6	1897.....	59,995	2.8	..
1888.....	62,762	..	1.3	1898.....	60,192	0.3	..
1889.....	64,305	2.4	..	1899.....	60,720	0.87	..
1890.....	68,399	6.4	..	1900.....	61,356	1.05	..
1891.....	66,985	..	2.06	1901.....	58,930	..	3.9
1892.....	63,093	..	5.8	1902.....	57,396	..	2.6
1893.....	63,799	1.1	..	1903.....	58,107	1.2	..

TABLE IV.

SHOWING THE YEARLY PERCENTAGE, INCREASE AND DECREASE IN DEATHS FROM TUBERCULOSIS AND PHTHISIS IN SCOTLAND FOR THE YEARS 1876 TO 1903 INCLUSIVE.

YEAR.	TUBERCULOSIS, DEATHS.	INCREASE.	DECREASE.	PHTHISIS, DEATHS.	INCREASE.	DECREASE.
1876.....	12,219	..	..	8,491	..	..
1877.....	12,193	..	0.21	8,342	..	1.7
1878.....	12,567	3.04	..	8,445	1.2	..
1879.....	12,098	..	3.4	8,336	..	1.2
1880.....	11,989	..	0.8	8,074	..	3.1
1881.....	11,275	..	5.9	7,739	..	4.1
1882.....	11,608	2.8	..	8,012	3.7	..
1883.....	11,092	..	4.4	8,401	4.8	..
1884.....	10,795	..	2.6	7,915	..	5.7
1885.....	10,724	..	0.65	7,922	0.08	..
1886.....	10,942	2.3	..	7,959	0.46	..
1887.....	10,275	..	6.09	7,418	..	6.7
1888.....	9,725	..	5.3	7,044	..	5.04
1889.....	9,722	..	0.03	7 098	0.7	..
1890.....	10,294	5.8	..	7,660	7.8	..
1891.....	10,141	..	1.4	7,361	..	3.9
1892.....	9,318	..	8.1	6,765	..	8.09
1893.....	9,801	5.1	..	6,921	2.3	..
1894.....	9,729	..	0.73	7,108	2.7	..
1895.....	10,688	9.8	..	7,688	8.1	..
1896.....	9,685	..	9.3	6,893	..	10.3
1897.....	10,085	4.1	..	7,200	4.4	..
1898.....	10,140	0.54	..	7,090	..	1.52
1899.....	10,497	3.52	..	7,275	2.6	..
1900.....	10,366	1.53	..	7,299	0.32	..
1901.....	9,911	..	4.1	6,776	..	7.1
1902.....	9,536	..	3.17	6,572	..	3.0
1903.....	9,726	1.9	..	6,630	0.88	..

STATISTICAL DATA RELATIVE TO TUBERCULOSIS IN MEXICO.

By Dr. Eduardo Liceaga,
Mexico.

Instead of wearying my hearers with a reading of a dry statement of numbers, I will ask them to look at the diagram which I present, covering a period of thirty-nine years, from 1869 to 1907, inclusive.

From that diagram it can be seen that the number of deaths from tuberculosis reached a high figure in the years 1893 and 1901, that afterward there was a pronounced decrease in those numbers until 1904, and that during the last four years the figures have not varied to any great extent.

In a general way the curve follows at a distance the variations in the number of deaths from diseases of all kinds, without one curve exactly following the other, because we have had epidemics in typhus in 1876–1877, 1886–1887, 1890, 1893, and 1901, in which years the general mortality rapidly increased through the ravages of those epidemics.

Another fact to be noted is that the increase in the number of deaths from tuberculosis is in proportion to the following three factors:

First: The progressive increase in the population of the city:

Second: The increase in the number of individuals who come to the capital city from all parts of the republic, and especially from the coasts as well as foreign countries, especially from the United States, on account of the increasing prosperity during the last thirty years, and—

Third: The number of consumptives from both coasts who come to seek relief in Mexico City.

These three factors explain the total increase in the mortality from tuberculosis.

If we come down to the localization of tuberculosis in the different organs, we find that in the ten years from 1898 to 1907 the number of deaths caused by pulmonary tuberculosis shows high figures as compared with the others. We also find a decline of the disease during the last five years, which is probably due to the promptness with which the diagnosis is now made, and the better attendance given to incipient consumptives.

A study of the other columns shows us that, in order of frequency, but very far from pulmonary tuberculosis, comes abdominal tuberculosis, which

carries off a great number of children. In descending order we have general tuberculosis, followed by meningeal tuberculosis, laryngeal tuberculosis, and, lastly, Pott's disease and white tumors.

The figures serve to establish a comparison with other cities, and to show the conditions with respect to tuberculosis in Mexico, as measured by the general mortality, that is to say, the relation which exists between the deaths from tuberculosis and those registered of all other kinds of diseases. This proportion, during the period of thirty-nine years under study, is 8.42, a lower proportion than that of most cities with a population of over 400,000 inhabitants, in spite of the accidental causes which have led a great number of consumptives to the capital of the Mexican republic from the rest of the country and abroad.

But if we take the number of deaths by themselves during the last five years, we reach the following figures:

Number of deaths from diseases of all kinds	92,718
Deaths from tuberculous diseases	8,063
Proportion	8.69

If we compare this proportion with that which obtains in the principal cities of the world, we will still find a difference in favor of our climate, with respect to those places.

The following table shows the relation between the general death-rate and that caused by pulmonary tuberculosis, in the year 1907, in the cities named, according to a table compiled by the General Board of Municipal Statistics of the city of Buenos Aires:

Paris	21.35	Munich	12.68
Prague	20.04	Roubaix	12.62
Gothenburg	17.24	Luxemburg	12.60
Lyons	16.88	Dublin	12.52
Vienna	16.73	Saint Petersburg	12.17
Havre	16.72	Belfast	11.77
Christiania	16.45	Zurich	11.67
Lille	15.81	Copenhagen	11.57
Geneva	15.44	Venice	11.49
Breslau	15.29	New York	11.40
Stockholm	15.28	Odessa	11.39
Nuremberg	14.51	Buenos Aires	11.36
Berlin	14.23	Amsterdam	10.90
Frankfurt-am-Main	13.94	London	9.66
Dresden	13.84	Moscow	9.46
Bern	13.76	Madrid	9.43
Leipsic	13.69	Basel	9.30
Hamburg	12.77	Cologne	8.65

DISCUSSION.

Dr. J. W. Irwin (Philadelphia): I congratulate Dr. Wilbur on his paper, which is sure to help us in registration, if the people are thoroughly acquainted with its importance. The physician frequently strikes snags in trying to

report cases, but, as Dr. Wilbur has said, because of not having registration laws he neglects to report a case of tuberculosis, and also fails to report it as a cause of death on the certificate of death. One thing in particular has been called to my attention. In the case of policies issued by industrial insurance companies and societies, a plan has been that the policy which is issued to the poorest people contains a small clause, usually printed in very fine type, to the effect that, in case of death from tuberculosis, only one-half or one-third of the amount of insurance will be paid. The result is when poor people die of tuberculosis, relatives or friends see the clause relating to tuberculosis, and frequently request the physician to make out the certificate from some other disease; which is almost equivalent to saying, "I will not get the insurance if you issue the certificate as due to tuberculosis." If the insurance companies can be made to issue a policy without such clause, or with the clause printed in the same size type as the rest of the policy, we would probably not have so many requests made to give another cause of death.

Another reason is the fact that many times the physician is afraid to tell the patient that he is tuberculous, for fear that, because of such knowledge, he will die very rapidly. I think if we will insist upon our legislatures enacting compulsory registration laws, we will find the amount of tuberculosis larger from a statistical standpoint. Many cases in Philadelphia have been registered under other names.

Dr. E. C. Levy (Richmond): To any one who has noted this exhibition and attended the section meetings it must be a matter of surprise that the very fundamental thing of vital statistics appears on the program in only two papers. In looking at the exhibits of microscopical and bacteriological sections and the pathological exhibits, if we had the feeling that the instruments were incomplete and unreliable, they would have very little significance for us; and yet all of our figures, all of our statistics, certainly in the United States, must be so labeled. Until we get accurate registration throughout the United States, all deductions must be more or less unreliable. The one point brought out by Dr. Irwin,—the last,—that insurance companies evade the payment of insurance when death is due to tuberculosis, and the falsification of death returns, has interested me personally for two or three years. The subject was brought up at Atlantic City last year at the meeting of the American Public Health Association, and for those members who have encountered the same difficulty it may perhaps be interesting to know what the city of Norfolk, Va., has recently done. The insurance policy applies especially to the negro, for the reason that every negro has a little industrial policy—enough to pay for burial. The Norfolk Anti-Tuberculosis League has taken up this matter. They have an attorney who has volunteered his services, and they have let me know that this attorney is soon ready to con-

test the action of any insurance company which refuses to pay a policy because the decedent dies of tuberculosis. That has been done, published, and up to date there has been no request for the services of the attorney. In other words, it is believed that the insurance companies are paying these policies, and Dr. Grandy assures me that the action taken will undoubtedly do much to lessen false returns to insurance companies. Of course, the next step is to have the physician, who has heretofore been so weak as to yield to the importunities of the family, now understand that there is no longer any necessity for such falsification, and that they are not thereby rendering any aid to the family.

I wish to commend, although it seems it needs no commendation, the work of Dr. Wilbur. All of us in these United States feel that when we send in our returns to the Census Bureau they are worked up in the best fashion. It gives me great pleasure, in closing, to move that this Section recommend the adoption of Dr. Wilbur's resolutions.

(Action was taken that the resolutions referred to will be submitted to the Committee on Resolutions.)

Dr. W. R. Batt (Harrisburg, Pa.): To those of us who have had the privilege of listening to the papers presented in this particular Section one fact seems to have been clearly established, namely, that the complete and accurate registration of both deaths and living cases is absolutely essential to any successful campaign against tuberculosis. This fact has been so clearly expressed, not only in this Section, but in every other Section of this Congress, wherever the control and restriction of tuberculosis has been discussed, that it would seem to admit of no further argument. With such a unanimous expression of opinion, it ought to appear reasonable, therefore, that the registration of tuberculosis should be accomplished without any serious difficulty, and be complete and accurate in every detail. The experience of almost every State and municipal office in which exhaustive registration has been attempted, shows that in practice the actual reverse is unfortunately too true, and that the registration of tuberculosis is one of the most difficult problems with which State or municipal governments are compelled to deal.

When we inquire into the nature of these difficulties, there appear to be just two conditions responsible for our failures:

First, the indifference and neglect upon the part of the medical men to report cases occurring in their practice.

Second, the reluctance of State and municipal authorities to enforce these reports either by invoking the penalties of laws already enacted or which are entirely within their power to enact.

The first condition, in view of the pronounced attitude of the medical profession, is simply an evidence that physicians frequently in matters of

public concern neither practise what they preach nor are willing to be judged by the standards which they publicly advocate. The second condition is due largely to an outgrowth of sentiment which finds its origin in the first condition.

The plea has been made that education is absolutely essential to a successful campaign against tuberculosis—education of the physician, education of the people, and education. No one has questioned the wisdom of this proclamation. Its necessity has been thoroughly recognized, and the hand of authority has been stayed in deference to it. It is, however, twenty-five years since the direct cause of tuberculosis has been known to the world. A quarter of a century has been devoted to education. May we not, at this time, reasonably ask ourselves as individuals, as municipalities, as States, and as nations, if the majority of those people who are capable of education or who are willing to be educated have not exhausted their opportunity and their privileges? We have wasted no such time with other diseases, but years have elapsed since Eberth isolated the bacillus of typhoid fever, and to-day the compulsory notification of typhoid by health authorities is a recognized necessity and is more or less rigidly enforced. Why should tuberculosis, whose ravages are infinitely greater, be treated with less concern?

May we not at this time, beyond a question of reasonable doubt, require that physicians, even to the point of compulsion by invoking legal penalties, be required to register all cases of tuberculosis? and may we not equally as well insist that the unrestricted liberty of a tuberculous person be made dependent upon the observance, habits, or customs which will not endanger the lives of others?

Figuratively speaking, in deference to public sentiment we have handled tuberculosis for a quarter of a century, so far as legal authority is concerned, with gloves on; are we not ready to take off at least one glove? For if the experience of the past may be accepted as a guide, this great fight will sooner or later have to be made with naked hands, if we ever hope to be victorious.

Dr. Theodore Altschul (Prague), in discussing Dr. Wilbur's paper, pointed out the difficulties encountered in compulsory notification, and the absolute necessity of a system of compulsory notification for the collection of statistics. Untrue statistics are worse than useless. As regards a satisfactory system for the collection of statistics of tuberculosis, he has taken occasion to closely examine the Bertillon system, and finds it insufficient from the medical standpoint, largely because of the fact that medical statistics can only be properly collected by medical men. He thought that a committee should, therefore, be composed of two parts—first, of a medical group to collect and study the statistics from a medical standpoint, and, second, a group of pure statisticians, both groups working separately, but combining their results. He believes that it would be one of the greatest advances.

THE NEED OF FAMILY HISTORIES FOR THE STUDY OF TUBERCULOSIS.

By Charles V. Chapin,
Providence, R. I.

For twenty years the writer has been keeping what may be called family records of cases of diphtheria and scarlet fever reported in Providence. An enumeration is made of all the members of the family and of other families in the house, with ages and occupation, and previous attacks of the disease, and various facts are noted as to exposure and precautions taken. These records have proved of the utmost value in throwing light on many problems connected with the epidemiology of these diseases. Much has been learned about the period of incubation, and the degree of contagiousness in the family for different ages, and for the sexes, has been well worked out. The age and sex liability to contract the disease outside the family is shown to be different from the liability in the family. The advantages of isolation in the family are indicated, as is also the value of the removal of the patient to the hospital, or the removal of the well members of the family from the home. The danger from patients returning from the hospital too soon, or from the neglect of disinfection, can be clearly shown. So, too, can the danger of the extension of the disease to other families in the house. Much light has been thrown upon the question of modes of infection, whether by the air, by fomites, by food, or by contact.

The value of these family records suggested that similar records of tuberculosis would be of equal value, and when the registration of this disease in Providence was provided for, the attempt was made to secure such family histories, but was not successful. It is very much more difficult to obtain histories for tuberculosis than for diseases like diphtheria, scarlet fever, smallpox, and typhoid fever. The latter are acute, the period of incubation or latency is usually short, and the whole episode of family infection is closed in a few weeks, or at most in a few months. But tuberculosis is a chronic disease, and the period of incubation or latency may, so far as is known, be years—perhaps many years. It is difficult to determine which members of the family have had the disease or when they became sick, or where they were at the time. In the light of present knowledge a family history cannot be considered closed until every member of the family is dead.

Even then it cannot be certain that death did not occur during the latent period. The difficulties are, however, for many cases not insuperable, and it is of the highest importance that they should be overcome, and that a serious effort should be made to secure such histories, and to secure an extensive series of them.

Some of the most important problems connected with the study of tuberculosis can hardly be solved by animal experiment. Questions relating to individual susceptibility, to inheritance, to the effect of environment, and to the avenues of infection often involve such minute degrees of difference that deductions from animal experiments cannot with safety be applied to human beings. Laboratory work has yielded wonderful results in the past; indeed, it brought order out of chaos, and established the study of tuberculosis on a sure foundation. Laboratory work will continue to yield large returns in the future, but in tuberculosis, as in other infectious diseases, the study of the epidemiological together with the bacteriological aspect of the subject is essential. In such studies personal impressions and general observations, not based on accurate data, are to be distrusted. Epidemiology is a statistical study, and we cannot hope to extend our knowledge without sufficient statistical data. Mortality statistics of tuberculosis alone are valuable, and have done much to increase our knowledge, but a study of the disease in the family by means of carefully collected family histories ought to do more, and we may fairly hope will help to solve some of the important problems now under discussion.

For instance, there is no accord among investigators as to the relative importance of susceptibility and infection in human tuberculosis. No infectious disease can develop without the presence of its specific microorganism, and no germ can grow unless it is in a favorable medium. If all persons are equally susceptible to tuberculosis, then the question of infection only is of practical importance in the etiology of the disease. If, on the other hand, there are great differences in the degree of susceptibility, and many persons are practically immune, and at the same time infection is general and wide-spread, and impossible to avoid, exposure to infection is of little practical importance in the warfare against the disease. The bacteriologists have not solved the problem and the clinicians are not in accord. More extended and careful statistical investigation ought to be of great practical value.

It is generally admitted that tuberculosis is a disease with exceptional incidence on certain families. That is, given one case of the disease in a family, other cases are more likely to occur than was the first case, or than is a case to develop in any other free family. But exactly how great this family liability is we do not know, owing to lack of sufficient data. It is important to have a great volume of facts, and to have them classified according to race, social conditions, etc. Only complete family histories can furnish such data.

Given, for instance, a woman of thirty, married ten years, and dying of consumption, after four years of sickness we ought to be able to know with a fair degree of accuracy what the chance is that her husband, aged thirty-five, and her child, aged four, will die of tuberculosis, and at what age that event will happen. I know of no collection of facts at the present time sufficient to permit such a calculation.

Admitting an excess of this disease in certain families, we are at present uncertain whether hereditary susceptibilty or infection in the family is its principal cause. But a study of family histories ought to throw great light on this point. Husband and wife are not usually related by blood, and perhaps there may be other persons in the family environment who are of different stock. A study of the incidence of the disease on this alien stock ought to furnish evidence as to the relative importance of susceptibility and infection. Yet few attempts have been made to study the problem in this way. Clinicians tell us that the infection from husband to wife, and vice versâ, is very common, but when pressed for facts derived from full family histories, they can rarely furnish them. Moreover, the mere statement that marital infection has occurred in a certain number of instances means little in itself. The age, duration of disease, and interval between attacks must all be considered, and considered in relation to the incidence of the disease on all married persons of the same ages living under similar conditions. Longstaff many years ago undertook such a critical study of the problem, but his data were too few and his necessary assumptions too numerous to render his conclusions decisive. Recently Nevin and Karl Pearson, from a study of data derived largely from the same locality, drew directly opposite inferences. At present it can be said that we have no conclusive evidence as to whether husbands or wives of tuberculous mates are especially prone to the disease, and we have no data sufficient for a really critical study of the problem. Yet it is highly probable that this important problem could be satisfactorily solved if we had a sufficient number of family histories.

Another question of great importance is, How soon after infection is the disease likely to become manifest? The statistical study of the latent period in tuberculosis is by no means easy, but the examination of a large number of family histories would undoubtedly throw much light on the question, as similar studies in scarlet fever, diphtheria, and typhoid fever have on the incubation of those diseases.

It is almost universally assumed that infection of the house is an important factor in the extension of tuberculosis, and the existence of "lung blocks" in various cities has been used as an unanswerable argument. But without denying the fact of house infection, it may be affirmed, without fear of contradiction, that no statistical evidence has thus far been presented of the alleged fact. It might very well be that if the family histories of all the cases

in these lung blocks should be carefully studied, the supposed evidence in support of the theory would fall to the ground.

For some years great efforts have been made to check tuberculosis by teaching people to avoid infection. Boards of health and antituberculosis leagues have been giving directions for the care of sputum, and have been inculcating habits of personal cleanliness. It is fair to ask, what evidence have we that any good has resulted? The decline in the tuberculosis death-rate is usually offered in evidence, but the recklessness of assuming that this decline is due to the preventive measures that have been undertaken, or to any group of these measures, must be apparent to all. A study of the histories of families where preventive measures have been carried out, in comparison with those of families where they have not, ought to furnish good evidence for or against the value of these measures, and it is only by such studies that we can acquire such knowledge.

There are many other problems which can only be satisfactorily studied by means of family histories. Karl Pearson* has recently published a very instructive and suggestive study of the family histories of cases of pulmonary tuberculosis. While some of his conclusions may be criticized, and while, as he admits, his data were far too few, he has well indicated some of the lines along which such investigations should be made. Indeed, it was his article which suggested this paper.

I do not find that in this country the collection of accurate and complete family histories has received much attention, and certainly little critical study has been bestowed upon them. Health officials, sanatorium officers, and clinicians are interested chiefly, if not exclusively, in the patient. The epidemiologist should bestow as much attention upon every member of the family or household as upon the patient.

It is no easy matter to initiate and carry on collective investigations, yet some sort of collective work along the lines here indicated seems desirable. No one person can collect sufficient data, and data from various places and relating to various classes are needed. But the facts should be comparable, and uniform schedules should be employed. I wrote to Professor Pearson for a copy of the schedule used by him, but he declined to send me one, on the ground that the many Americans to whom he had given assistance invariably failed to acknowledge it. Correspondence with leading American sanatoriums, and with health officials and practising physicians, has failed to discover any very definite plan for recording family histories in the sense in which the term is here used. The Phipps Institute schedule makes more provision for this than do others that I have seen, at least in this country. The Institute has, moreover, attempted to make use of the data secured.

*Pearson: Drapers Co. Research Memoirs, A First Study of the Statistics of Pulmonary Tuberculosis, 1907.

In England Dr. Niven, of Manchester, has done good work in the collection and use of family histories.

It seems to me that the family, which should be the unit for investigation, should consist of the husband and wife, the children, and all others who may happen to be members of the household. If the children are primarily infected, only one schedule will be needed; but if one of the parents is infected, another schedule will be needed for the family of which that parent was a member before marriage. In all schedules it is desirable to have as few data as possible and omit none that are necessary. The following is a schedule that I have planned to use in Providence. The individual history of a patient may be noted on the reverse, or reference may be given to another set of records.

TUBERCULOSIS.

No. 246. MEDICAL HISTORY OF FAMILY (*i. e.*, FATHER, MOTHER, CHILDREN, SISTER, BROTHER). DATE, JUNE 18, 1908.

NAME.	AGE AT PRESENT, OR IF DEAD, AT DEATH.	RESIDENCE AT PRESENT OR AT TIME OF DEATH.	TUBERCULOUS? DATE OF FIRST SYMPTOM.	IF DEAD, DATE AND CAUSE OF DEATH.
John Blank.....	25	416 E. 29th St.	Had enlarged glands, 1893. Not strong since. Began to cough two years ago.	
Henry Blank (fa.) ..	52	" " " "		
Fred Blank.....	22	" " " "		
Sarah Blank.....	21	" " " "		
Mary Blank.....	4	126 West Ave.	Sick about one month.	Dec. 4, 1893. Tuberculous meningitis.

MEDICAL HISTORY OF MEMBERS OF HOUSEHOLD OTHER THAN RELATIVES.

Mary Blank nèe Smith. Tb. in family. See No. 132 in June 2, 1882....	52	416 E. 29th St.	..	..
Maid lived with family twelve years..	30	" " " "		

The preparation of a schedule, the collection of the data, and their study may be undertaken by a committee, but committee work is likely to lack enthusiasm and initiative. That more family records should be made and that they should receive critical study is certain. It is to be hoped that in the near future health officials, dispensary workers, and hospital physicians will become more and more interested in this line of research.

Necesidad de la Historia de las Familias Para el Estudio de la Tuberculosis.—(CHAPIN.)

Se establece el valor de los antecedentes de la familia respecto á los casos de difteria y fiebre scarlatina. Estos resultados sugieren que anales semejantes deben conservarse de los casos de tuberculosis. Se señala la ausencia de tal estadística y se insiste en lo dificil de obtener el hecho; que tales datos serían de gran valor en los estudios epidemicológicos de la enfermedad, y serían una ayuda para resolver algunos problemas oscuros actualmente en discusíon, tales como la herencia, la susceptibilidad, el estado latente, lugar de infección, etc. También, ayudarían estos datos para determinar métodos efectivos para prevenir la enfermedad. Se indica la familia como unidad de estudio, así como también se indica el uso de cédulas para la recolección de datos.

Besoin d'histoires de famille pour l'étude de la tuberculose.—(CHAPIN.)

La valeur de registres de cas de diphthérie et de fièvre scarlatine dans les familles étant admise, il faudrait tenir des registres pareils de cas de tuberculose. Le manque de statistiques pareilles est signalé, et quoiqu'elles soient difficiles à obtenir, on assure que de telles données seraient très-utiles dans les études épidémiologiques de la maladie et aussi pour résoudre certains problèmes obscurs que l'on discute à present, tels que l'hérédité, la susceptibilité, la latence, l'infection des lieus, etc.

Ces données aideraient aussi à découvrir des méthodes effectives pour l'empêchement de la maladie. On suggère la famille comme unité pour l'étude, et l'usage de listes, uniformes pour recueillir les statistiques.

Die Notwendigkeit von Familiengeschichten für das Studium der Tuberkulose.—(CHAPIN.)

Der Wert von Familienberichten in Fällen von Diphtherie und Scharlach ist constatirt. Diese Resultate zeigen, dass ähnliche Berichte in Fällen von Tuberkulose gehalten werden sollten. Die Abwesenheit von solchen Statistiken ist fühlbar, und während sie schwer zu erhalten sind, ist die Tatsache betont worden, dass solche Daten von grossem Wert wären in epidemiologischen Studien der Krankheit und eine Hilfe in der Lösung der dunklen Probleme, die jetzt unter Discussion sind, wie Erblichkeit, Empfänglichkeit, Latenz, Platzinfection, etc. Diese Daten würden auch bei der Bestimmung wirkungsvoller Methoden zur Verhinderung der Krankheit helfen. Die Familie ist als die Einheit für das Studium vorausgesetzt und der Gebrauch einheitlicher Tabellen für das Sammeln der Daten wird dringend verlangt.

OFFICIAL INFORMATION NECESSARY TO SOCIAL CONTROL OF TUBERCULOSIS.

By Messrs. W. H. Allen and Rufus E. Miles,

Bureau of Municipal Research, New York.

The paramount needs of the crusade against tuberculosis are now financial support and administrative efficiency, rather than further inquiry and experiment. Scientific knowledge already possessed will not be applied unless the public is continuously informed as to danger centers, resources for fighting tuberculosis, field covered, field not covered, work done, work not done, and equipment and cost necessary to discharge 100 per cent. of each community's obligation.

Indispensable to financial support and administrative efficiency are the making known work already done and emphasizing work not yet done, through: (*a*) Administrative records and reports within health department, hospital, etc.; (*b*) periodic reports to the public, giving information necessary to enable communities to gage progress and forecast needs; (*c*) annual budgets, segregated by function, comparing cost of work already done with cost of work necessary for the coming year, and prohibiting the transfer from purpose advertised without public explanation of the reason.

Budgets and public reports will not be educative and truthful unless officials receive daily and weekly reports from subordinates, describing work done when it is done, so that work not done properly, or not attempted, will stand out clearly. No hospital or department of health can be efficient that runs after information instead of having information flow continuously to headquarters. Finally records, reports, and budgets should be uniform, so that one city can learn from others' experience.

The value of administrative records and of reports that reflect administrative results is strikingly shown in the reporting forms recently adopted by the New York Department of Health. Notable features of six tables devoted to tuberculosis are: Elimination of duplicate registration; 21 items pertaining to living cases registered; summary of cases in homes under observation; 21 items pertaining to district inspection, disinfection,

nurses' treatment, etc.; 36 items showing results of diagnosis, examination of sputum, and clinical treatment.

Most important of all municipal days is budget day, hitherto most neglected. As leader of the community in the war on tuberculosis the public health officer must not only direct the execution of preventive, curative, and educational measures, but he must secure support for them. No matter how brilliant his strategy, he fails if his measures are crippled by insufficient resources. Budgets need not be abstruse or complex. Graphic presentation is not inconsistent with professional dignity. Budgets should further business-like relations between health officials and the money-voting body. Budgets properly constructed will stimulate public interest in the official program. If tuberculosis clinics are not sufficiently provided for, the suspension of their work for two weeks might rouse such a protest that funds would be immediately forthcoming. New York City's Department of Health has taken the lead in presenting a budget showing clearly work not yet done, and instead of asking support for a "Bacteriological Laboratory Fund," it now requests provision for: 1. District inspection, medical inspection, tuberculosis nurses. 2. Clinics for treatment of communicable pulmonary diseases, attending physicians and nurses. 3. Diagnosis laboratory, bacteriologists, collection, preparation, and examination of specimens.

This effort to make plans clear has been rewarded by largely increased appropriations. Moreover, its experience has led directly to the adoption (by the American metropolis) of a segregated, classified budget, that bids fair to revolutionize American methods of providing not only for health programs, but for the administration of every phase of public business.

Über die nötigen offiziellen Informationen für die soziale Controlle der Tuberkulose.—(ALLEN UND MILES.)

Was gegenwärtig im Kampfe gegen die Tuberkulose hauptsächlich Not tut, sind nicht weitere Nachforschungen und Experimente, sondern finanzielle Unterstützung und administrative Tätigkeit. Um die wissenschaftlichen Kenntnisse, welche wir bereits besitzen, praktisch verwerthet zu sehen, muss das Publikum fortwährend informirt werden über die Gefahr von Krankheitsherden, über die vorhandenen Mittel zur Bekämpfung der Tuberkulose, über das bereits bearbeitete und das noch zu bearbeitende Feld, über das was bereits getan worden ist und was noch zu tun bleibt, über die notwendige Ausstattung und Ausgaben, welche jedes Gemeinwesen haben muss, um 100% von seinen Verpflichtungen nachzukommen.

Für finanzielle Unterstützung und administrative Tätigkeit ist es un-

bedingt notwendig, bekannt zu machen, was bereits getan ist und besonders hervorzuheben, was noch nicht getan ist. Das soll geschehen durch: (*a*) Protokollirung and Berichterstattung aus dem Gesundheitsamt, Hospitälern u. s. w.; (*b*) Periodische Berichterstattung fürs Publikum, aus denen dasselbe durch die nötige Auskunft in den Stand versetzt wird, den gemachten Fortschritt zu überblicken, und die bestehenden Bedürfnisse zu überschlagen. (*c*) Jährliche Finanzberichte, nach verschiedenen Abteilungen gesondert nebst Vergleichanstellung der Ausgaben für Geleistetes mit den notwendigen Ausgaben für das kommende Jahr, wobei Übertragungen von Geldern, welche für einen bestimmten Zweck bewilligt wurden, für einen anderen, ohne öffentliche Begründung desselben, verboten werden.

Finanz- und sonstige öffentliche Berichte können nur dann erzieherisch und wahrheitsgetreu sein, wenn die Beamten täglich und wöchentlich von ihren Gehülfen Berichte erhalten, in denen das was berichtet, auch wirklich geschehen ist, so dass diejenige Arbeit, welche nicht getan worden ist, oder nicht versucht worden zu tun, klar hervortritt. Kein Hospital oder Gesundheitsamt kann ordentlich geführt werden, wenn es erst Informationen einfordern muss, anstatt dass dieselben stetig ins Hauptamt einlaufen. Endlich sollten Protokolle, Berichte und Budgets nach einem gleichartigen Princip abgefasst werden, damit eine Stadt aus der Erfahrung einer anderen lernen kann.

Der Wert von Verwaltungs-Protokollen und Berichten, die Resultate veranschaulichen, tritt sehr deutlich aus den von dem Gesundheitsamte in New York vor kurzem adoptirten Berichts-Formularen hervor. Bemerkenswerte Punkte in den der Tuberkulose gewidmeten 6 Tabellen sind: Vermeidung zweimaliger Registrirung, 21 Posten in Bezug auf Registrirung lebender Fälle, Gesammtbericht der Fälle, die zu Hause unter Beobachtung stehen, 21 Posten in Bezug auf Distriktinspektion, Desinfektion, Behandeln von Pflegern u. s. w., 36 Posten, welche die Resultate der Diagnose, der Untersuchung des Auswurfes und der klinischen Behandlung zeigen.

Der wichtigste Tag von allen ist bei einer Stadtverwaltung der Budget-Tag, welcher bis jetzt meistens vernachlässigt wurde. Als Hauptführer des Gemeinwesens im Kampfe gegen die Tuberkulose muss der öffentliche Beamte nicht nur die Ausführung von Massregeln zur Verhütung, Behandlung und Erziehung leiten, sondern er muss auch für die nötige Unterhaltung derselben Sorge tragen. Er mag noch so glänzende strategische Fähigkeiten besitzen, wenn aber die von ihm vorgenommenen Massregeln durch ungenügende Mittel verkrüppelt werden, so muss er verlieren. Ein Budget braucht nicht schwerverständlich oder complizirt zu sein. Eine graphische Darstellung ist nicht unvereinbar mit professioneller Würde. Das Budget muss geschäftsmässige Beziehungen zwischen den Vorstehern des Gesundheitsamtes und der geldbewilligenden Körperschaft fördern.

Richtig abgefasste Budgets regen das öffentliche Interesse am offiziellen Programm an. Wenn Kliniken für Tuberkulöse nicht genügend versorgt werden, so genügt es, die Tätigkeit derselben für zwei Wochen einzustellen um einen solchen Protest hervorzurufen, dass sofort Mittel verschafft werden würden.

Das Gesundheitsamt der Stadt New York ist das erste, welches ein Budget vorlegt, in dem klar auseinander gesetzt wird, was noch nicht getan worden ist, und statt um Unterstützungsgelder für ein bakteriologisches Laboratorium zu bitten, verlangt dasselbe jetzt Bewilligungen—

1. Für Distrikt-Inspektion,—für ärztliche Inspektion,—für Pflegerinnen für Tuberkulöse.

2. Für Kliniken für übertragbare Lungenkrankheiten, für behandelnde Ärzte und Pfleger.

3. Für ein diagnostisches Laboratorium,—für Bakteriologen,—für sammeln, herstellen und untersuchen von Präparaten.

Diese Bemühungen, die Pläne klar vorzulegen, sind belohnt worden durch bedeutend vergrösserte Bewilligungen. Ferner hat es direct zur Annahme (in den amerikanischen Hauptstädten) abgesonderter, klassifizirter Budgets geführt. Dieses verspricht, eine Umwälzung nicht nur in den amerikanischen Methoden für Gesundheitsmassnahmen hervorzubringen, sondern auch in der Leitung aller öffentlichen Geschäftsangelegenheiten.

AT WHAT AGE-PERIODS AND IN WHAT MEASURE HAS THE REDUCTION IN THE MORTALITY RATE FROM TUBERCULOSIS MANIFESTED ITSELF IN THE CITY OF NEW YORK DURING THE PAST FORTY YEARS?

By Dr. W. H. Guilfoy,
Registrar of Records, Department of Health, City of New York.

In studying the names given to the tubercular causes of death of forty years ago, we are struck with what appears to be an entire change of nomenclature when compared with the terms in vogue at the present day—phthisis pulmonalis has been superseded by pulmonary tuberculosis, hydrocephalus by tuberculosis of the meninges, tabes mesenterica by abdominal tuberculosis, psoas abscess and disease of spine by Pott's disease, hip-joint disease by tuberculous hip-joint disease; the only allied term that has held its own in all these years being scrofula. These changes indicative of infection by a specific agent, and consequent upon the discovery by Koch of the tubercle bacillus, represent the establishment upon a firm basis of the recognized principles of preventive and curative ways and means employed in the extermination of this dread destroyer.

The late Dr. Elisha Harris, the first Registrar of Vital Statistics of the Metropolitan Board of Health of the City of New York, and one of the ablest and foremost pioneers in blazing out the paths to be followed in sanitary and statistical warfare,—for in those days it was actual warfare,—wrote into the pages of its third annual report, in 1868, the following sentences:

"Hygienists now can measurably restrain and prevent the generation of this disease, which in our Northern and Middle States prematurely destroys from 20 to 35 per cent. of all persons who pass the age of childhood, or from 12 to 18 per cent. of the total at all ages; for at least four of its factors of causation are now recognized in the list of avoidable conditions, to wit: (1) Wetness of grounds and habitation; (2) impurity of air and unwholesomeness of circumstances in indoor life; (3) defective sunlighting of dwellings; (4) needless exposure of non-consumptive persons to the consumptive in unventilated places; avoidance of the contagious element in phthisis and of the circumstances that render its contagious property operative. Even the hereditary constitutional perpetuating property of tuberculosis may, year by year, and generation after generation, be diminished in the extent of its operation, for hygienic considerations should, and in a higher civilization will, favorably influence intelligent men in the selection of wives who are to

be the mothers of their children: yet this may be the last in the series of preventive measures against phthisis; and, like the physiological requirements of hygienic alimentation, exercise, and sunlighting, the applications of hygiene to the hereditary improvement of the quality of our race will be attained only in a higher state of the popular intelligence."

The man who formulated such doctrine forty years ago could not but view with contented eyes, in the event of a visit as a reincarnated spirit to this hustling mundane sphere, the segregation of consumptives, the open-air treatment, the avoidance of the infectious element, the sunlighting of dwellings, the establishment of parks, hygienic alimentation and sanitation, and last, but not least, the elevation of popular intelligence to a higher plane; the phrase "a higher civilization will favorably influence intelligent men in the selection of wives who are to be the mothers of their children" reveals us to-day in the position of "side-stepping" this knotty problem. No small wonder, then, that the work of comparison of the statistics of the present day with those compiled under his supervision was simple in the extreme.

The first striking feature of the reduction in the mortality rates is that at every age-group in both males and females the percentage of decrease is considerable, with the exception of the age-group 45–55 in the males, in which the reduction is only 1 per cent., and the group 10–15 in the females, in which it reached the comparatively low mark of 7 per cent., this latter explainable by the impaired general physical condition attendant upon the assumption of the generative function and thereby an increased liability to tubercular infection.

The second feature of the decrease in the pulmonary tuberculosis rate is the greater decrease at all age-groups among the females compared with those of the males, with the exception of the ages under five and between ten and fourteen; the reduction percentage of the female mortality at all ages is 55, and that of the males only 29—slightly more than one-half that of the females. This is the more remarkable when we consider that of late years the female has taken up occupations classed as dangerous from an infectious standpoint, such as those of typewriting, saleswomen, flower-making, feather-working, etc. Why should the rate from this cause of death be almost 50 per cent. lower in the female sex than in the male? Exposure to the elements on the part of the latter has been offered as an explanation, and is true to some extent, as the death-rate from pulmonary tuberculosis up to the twenty-fifth year is almost the same in the male as in the female, and at all ages above twenty-five the rate among males is greatly in excess. The abuse of alcohol is undoubtedly one of the potent factors in rendering the male more prone to infection and less amenable to recovery than the female; even the use of alcohol in the treatment of tuberculosis is being gradually discarded by the careful physician of to-day.

A third explanation of this phenomenon of the weaker sex surviving the stronger is that based upon anatomical and physiological difference of sex, the female, by reason of the predominance of superior costal breathing, more fully expands the apices of the lungs, and as tuberculous inflammation generally begins at the apices, consequently the natural physiological exercise of these parts militates against harboring the bacillus tuberculosis therein.

The table also shows that at the ages above sixty-five years, in both sexes, the reduction in the death-rate has been greatest: that the age-group at which the heaviest mortality prevails is that of 45–54 in males and both sexes combined, and 35–44 in females; that at the age-group 45–54 seven males died to two females.

The claims made as to the considerable reduction (41 per cent.) in the death-rate from pulmonary tuberculosis at all ages, being one based upon the certification in early years of obscure pulmonary diseases as phthisis pulmonalis—the greater accuracy in diagnosis and certification of the present day serving to enter causes of death under their proper titles,—are not capable of statistical proof; on the contrary, it is fair to assume that in the past, if crude diagnosis placed doubtful pulmonary diseases under the heading "phthisis," thus transferring them from their proper heading under "diseases of the respiratory organs," we should expect to find the death-rates from the latter causes increased in harmony with the decrease from pulmonary tuberculosis. Such is not the case, however. Upon comparing the returns for the years 1868 and 1907, we find that at those age-groups at which the maximum number of deaths from pulmonary tuberculosis is reported, that is, between fifteen and forty-five years, the death-rate decreased 40 per cent. in pulmonary tuberculosis, while that from diseases of the respiratory organs not only did not increase at the ages mentioned, but at these, as well as at all ages, showed a decrease of 7 per cent. Again, we must take into consideration that since influenza has become a factor in mortality tables the deaths from respiratory diseases have increased considerably, and in the year 1907 this was especially true by reason of the severity of the epidemic; it may be argued that deaths which should have been entered as pulmonary tuberculosis in the year 1868 were credited to causes other than those of the respiratory organs, as evidenced by the increased death-rates from all causes at age-groups forty-five years and over, as shown in the table; but that argument may be met by a glance at the second table, which shows that the increase is due to the extraordinary rise in the death-rates from circulatory, urinary, and cancerous diseases, and the moderate one in the rates from respiratory diseases at these age-groups; the increased percentage in the death-rate at ages forty-five years and over was 251 in circulatory, 153 in urinary, 124 in cancerous, and 43 in respiratory diseases.

The death-rates from other tuberculous diseases at all ages show a much greater decrease than that from pulmonary tuberculosis, the percentage reduction being almost the same for males and females—78 against 76. This equality in the decrease is all the more curious by reason of the large discrepancy in the reduction of the rate from pulmonary tuberculosis in the female compared with that in the male. The rates at age-groups other than those under ten years should be disregarded by reason of the small number of deaths compared, especially those of the year 1868. Eighty per cent. of the deaths under ten years of age from other tuberculous diseases are reported as tuberculous meningitis, and it is likely that the decreased mortality from this cause is a real one, as the varieties of meningitis other than tuberculous show a considerable reduction in their death-rates.

The death-rates from all forms of tuberculosis show a considerable decrease at all ages, the reduction reaching 41 per cent. among the males and 60 per cent. among the females, that of both sexes being exactly 50 per cent.

The different age-groups of the males show considerable decreases, with the exception of that of 45–54 years, the increase being almost 1 per cent., which for all practical purposes may be disregarded; among the females the age-group 10–14 shows an increase of 15 per cent.

The third chart is based upon the absolute number of deaths reported in 1868 and 1907 from pulmonary tuberculosis, and shows the five age-groups at which the highest mortality occurs, arranged by sex and person in the order of their numerical supremacy. It shows that among the males the greatest number of deaths in 1868 occurred at the age-group 25–34 years, and the second greatest number at 35–44, and then follows the groups 15–24 and 45–54; in the year 1907 the first two mentioned groups exchanged places, as did the second two; in other words, that there was a postponement of the fatal issue in many instances, a comparatively short one considering the intervening gap of forty years. Among the females the age-groups in question maintain the same position in 1907 as in 1868; that is, there has been apparently no lengthening of life among females suffering from this disease; in fact, the comparison of the ratios between the figures of alternate age-groups for 1868 with those of 1907 warrants us in deducing that life has been shortened. As regards both sexes, the age-groups maintain the same position in 1907 as in 1868, but a study of the figures of both years justifies us in the conclusion that there is no shortening of the duration of life. In order to ascertain if these conclusions may be drawn, calculations were made as to the mean age at death from pulmonary tuberculosis of both sexes combined, and males and females separately between the ages of fifteen and sixty-four. Admission is made that using this test as a measure of the duration of human life is open to serious objection, but the percentages of the age-groups 15–64 of the entire population in 1907 are fairly identical with those

of 1868, the percentages under fifteen years and over sixty-five years of the populations in 1868 and 1907 varying considerably; these latter age-groups were therefore excluded, and as the results are used simply to corroborate deductions drawn from the table under consideration, we hold that the use of this test is allowable. The mean average age at death of males from this cause in 1868 was thirty-six years, three months, and in 1907, thirty-eight years and three months—an increase in length of life of two years; the mean average age at death of females from this cause in 1868 was thirty-six years, one month, and in 1907, thirty-three years and eight months—a shortening of the duration of life by one year and five months; the figures for both sexes combined were thirty-six years and one month in 1868, and thirty-six years and nine months in 1907—an increase of eight months. From this we must infer that the prolongation of life in tuberculous patients has been, on the whole, comparatively meager; that the male, by reason of his preponderance over the female as to tubercular infection, and probably by the self-sacrifice of his consort, has received more attention at the hands of the public officials than the female, and in consequence the latter has not fared so well as to the added duration of life. It is true she has progressed further as to the diminution of the death-rate at most age-groups and at all ages, when compared with the male; she has probably sought medical aid earlier than the male in the commencement of the disease, and consequently more cases of complete cure are credited to her sex than to the male. The figures reiterate the necessity of early diagnosis and treatment, for without these the outlook for the eradication of tuberculosis is indeed gloomy.

The brighter side of the question may be viewed from the standpoint that thousands of lives are saved yearly, as shown by the decrease in the death-rate at all ages. If the death-rate at all ages of both sexes in the year 1868 be applied to the population of the present boroughs of Manhattan and the Bronx, there would have been 10,190 deaths recorded from pulmonary tuberculosis, against 6030 actually recorded—a difference of 4160; that coincident with the saving of lives there has been a saving in health to the community immeasurable in its value. Another and darker view may be presented by the fact that during the past five years the death-rate from tuberculosis has been almost at a standstill in the city of New York, and its seems to me that more drastic steps must be taken if we are to progress in our work; standing still is retrograding. The city, State, and nation must provide for the old, advanced cases, for whom but slight provision has been made in the past, and who undoubtedly are the chief factors in the dissemination of infection. When this duty is fully performed, and not until then, we may hope to see the arrival of the happy day when tuberculosis has disappeared from the civilized world.

POPULATION, DEATHS, AND RATES PER 1000 AT DIFFERENT AGE-PERIODS FROM ALL CAUSES AND TUBERCULOUS DISEASES FOR THE YEARS 1868 AND 1907. OLD CITY (MANHATTAN AND BRONX).

	Population at Different Age-Groups.		All Causes.				Per Cent. Reduction in Mortality.	Pulmonary Tuberculosis.				Per Cent. Reduction in Mortality.	Other Tuberculous.				Per Cent. Reduction in Mortality.	All Tuberculous.				Per Cent. Reduction in Mortality.
			Deaths.		Rates.			Deaths.		Rates.			Deaths.		Rates.			Deaths.		Rates.		
	1868	1907	1868	1907	1868	1907		1868	1907	1868	1907		1868	1907	1868	1907		1868	1907	1868	1907	
										MALES												
Under 5 years ..	52,882	146,172	6,909	8,455	130.60	57.85	—56%	79	65	1.49	0.45	—70%	551	230	10.40	1.57	—85%	630	295	11.91	2.02	—83%
5–9.....	44,660	126,012	452	577	10.10	4.58	—55%	18	24	0.43	0.19	—56%	23	43	0.52	0.34	—35%	41	67	0.92	0.53	—42%
10–14....	39,450	106,782	199	286	5.04	2.68	—47%	19	16	0.48	0.15	—69%	13	11	0.33	0.10	—72%	32	27	0.80	0.25	—69%
15–19....	40,553	103,967	249	545	6.14	5.24	—15%	79	171	1.95	1.65	—15%	4	13	0.10	0.13	30%	83	184	2.04	1.77	—13%
20–24....	38,592	123,946	518	945	13.42	7.62	—43%	222	329	5.75	2.65	—54%	1	19	0.03	0.15	400%	223	348	5.77	2.81	—51%
25–29....	39,910	138,884	647	1,309	16.21	9.42	—42%	258	492	6.46	3.54	—45%	3	29	0.08	0.21	163%	261	521	6.54	3.75	—43%
30–34....	36,984	126,478	666	1,581	18 01	12.50	—31%	242	566	6.54	4 48	—32%	1	16	0.03	0.13	333%	243	582	6.57	4.60	—30%
35–44....	59,966	196,957	1,219	3,594	20.32	18.25	—10%	369	1087	6.15	5.52	—10%	10	27	0.17	0.14	—18%	379	1114	6.32	5.66	—10%
45–54....	37,639	108,920	992	3,468	26.36	31.84	21%	267	764	7.09	7.01	— 1%	6	32	0.16	0.29	81%	273	796	7.25	7.31	1%
55–64....	15 964	56,585	673	2.822	42.15	49.87	18%	159	305	9.96	5.39	—46%	8	7	0.50	0.13	—74%	167	312	10.46	5.51	—47%
65 & over	7,482	28,316	776	3,032	103.71	107.10	3%	100	114	13.37	4.03	—70%	9	4	1.20	0.14	—88%	109	118	14.57	4.17	—71%
All ages ..	414,082	1,259,617	13,300	26,614	32.12	21.13	—34%	1812	3933	4.38	3.12	—29%	629	431	1.52	0.34	—78%	2441	4364	5.89	3.47	—41%
										FEMALES.												
Under 5 years ..	51,805	145,044	6,158	7,190	118.90	49.57	—58%	68	67	1.31	0.46	—65%	453	181	8.74	1.25	—86%	521	248	10.06	1.71	—83%
5–9.....	44,486	126,463	404	473	9.08	3.74	—59%	23	21	0.52	0.17	—67%	12	37	0.27	0.29	7%	35	58	0.79	0.46	—42%
10–14....	39,920	107,531	134	296	3.36	2.75	—18%	22	55	0.55	0.51	— 7%	2	19	0.05	0.18	260%	24	74	0.60	0.69	15%
15–19....	47,765	123,093	274	510	5.74	4.14	—28%	96	185	2.01	1.50	—25%	5	23	0.10	0.19	90%	101	208	2.11	1.69	—20%
20–24....	48,140	149,658	525	815	10.91	5.45	—50%	248	298	5.15	1.99	—61%	1	20	0.02	0.13	550%	249	318	5.17	2.13	—59%
25–29....	45,230	142,734	581	974	12.84	6.82	—47%	248	342	5.48	2.40	—56%	1	18	0.02	0.13	550%	249	360	5.51	2.52	—54%
30–34....	36,518	114,452	520	1,013	14.24	8.85	—38%	186	291	5.09	2.54	—50%	2	14	0.05	0.12	140%	188	305	5.15	2.66	—48%
35–44....	59,659	172,421	944	2,146	15.83	12.44	—21%	332	461	5.57	2.67	—34%	4	17	0.07	0.10	43%	336	478	5.63	2.77	—51%
45–54....	36,296	103,698	642	2,040	17.69	19.67	11%	173	210	4.77	2.03	—57%	1	5	0.03	0.05	67%	174	215	4.79	2.07	—57%
55–64....	16,953	58,051	498	2,229	29.37	38.43	31%	119	96	7.02	1.66	—76%	4	10	0.24	0.17	—29%	123	106	7.26	1.83	—75%
65 & over	10,283	34 920	909	3,398	88.40	97.30	10%	87	71	8.46	2.03	—76%	11	4	1.07	0.11	—90%	98	75	9.53	2.15	—77%
All ages ..	437,055	1,275,065	11,589	21,084	26.52	16.53	—38%	1602	2097	3.67	1 64	—55%	496	348	1.14	0.27	—76%	2098	2445	4.80	1.92	—60%
										BOTH SEXES.												
Under 5 years ..	104.687	291,216	13,067	15,645	124.80	53.74	—57%	147		1.40	0.45	—68%	1004	411	9.60	1.41	—85%	1151	543	10.99	1.87	—83%
5–9.....	89,146	252,475	856	1,050	9.60	4.16	—57%	41	45	0.46	0.18	—61%	35	80	0.39	0 32	—18%	76	125	0.85	0.50	—41%
10–14....	79,370	214,313	333	582	4.19	2.72	—35%	41	71	0.52	0.33	—37%	15	30	0.19	0.14	—26%	56	101	0.70	0.47	—33%
15–19....	88,318	227,060	523	1,055	5.92	4.65	—21%	175	356	1.98	1.57	—21%	9	36	0.10	0.16	—60%	184	392	2.08	1.73	—17%
20–24....	86,732	273,604	1,043	1,760	12.03	6.43	—47%	470	627	5.42	2 29	—58%	2	39	0.02	0.14	—600%	472	666	5.45	2.43	—55%
25–29....	85 140	281,618	1,228	2,283	14.42	8.11	—44%	506	834	5.94	2.96	—50%	4	47	0.05	0.17	240%	510	881	5.99	3.13	—48%
30–34....	73,502	240,930	1,186	2,594	16.13	10.77	—33%	428	857	5.82	3.56	—39%	3	30	0.04	0.12	200%	431	887	5.86	3.68	—37%
35–44....	119,625	369,378	2,163	5,740	18.08	15.54	—14%	701	1548	5.86	4.19	—29%	14	44	0.12	0.12	..	715	1592	5.98	4.31	—28%
45–54....	73,935	212,618	1,634	5,508	22.10	25.90	17%	440	974	5.95	4.58	—23%	7	37	0.09	0.17	89%	447	1011	6.05	4.76	—21%
55–64....	32,917	114,636	1,171	5,051	35.59	44.06	24%	278	401	8.45	3.50	—59%	12	17	0.37	0.15	—59%	290	418	8.81	3.65	—59%
65 & over	17,765	63,236	1,685	6,430	94.84	101.7	7%	187	185	10.53	2.93	—72%	20	8	1.13	0.12	—89%	207	193	11.65	3.05	—74%
All ages ..	851,137	2,541,084	24,889	47,698	29.24	18.97	—35%	3414	6030	4.01	2.37	—41%	1125	779	1.32	0.31	—77%	4539	6809	5.33	2.68	—50%

DEATHS AND RATES PER 1000 AT DIFFERENT AGE-GROUPS FROM CIRCULATORY, URINARY, RESPIRATORY, AND CANCEROUS DISEASES, YEARS 1868 AND 1907. OLD CITY (MANHATTAN AND BRONX).

	Circulatory.				Per Cent. Decrease; Increase.	Urinary.				Per Cent. Decrease; Increase.	Respiratory.				Per Cent. Decrease; Increase.	Cancerous.				Per Cent. Decrease; Increase.
	Deaths.		Rates.			Deaths.		Rates.			Deaths.		Rates.			Deaths.		Rates.		
	1868	1907	1868	1907		1868	1907	1868	1907		1868	1907	1868	1907		1868	1907	1868	1907	
MALES																				
Under 5 years	17	56	0.32	0.38	— 19%	30	55	0.57	0.38	— 33%	907	2120	17.15	14.51	—15 %	..	..	..	..	..
5–9	12	35	0.27	0.28	— 4%	14	17	0.31	0.14	— 55%	39	69	0 873	0 548	—37 %	..	..	..	..	..
10–14	19	41	0.48	0.38	— 21%	7	4	0.18	0.04	— 78%	11	39	0 279	0.365	—31 %	4	35	0.02	0.06	—200%
15–19	16	42	0.40	0.40	..	8	12	0.20	0.12	— 40%	17	53	0 419	0 51	—22 %	..	..	..	..	..
20–24	22	63	0.57	0.51	— 11%	21	37	0.54	0.30	— 44%	40	105	1.04	0 847	—19 %	..	..	..	..	..
25–29	32	87	0.80	0.63	— 21%	35	74	0.88	0.53	— 40%	58	156	1.45	1.12	—23 %	2	12	0.05	0.09	— 80%
30–34	23	104	0.62	0.82	— 32%	37	104	1.00	0.82	— 18%	71	204	1.92	1.61	—16 %	4	23	0.11	0.18	— 64%
35–44	68	358	1.13	1.82	— 61%	88	306	1.47	1.55	— 5%	124	507	2.07	2.57	—24 %	13	106	0.22	0.54	—145%
45–54	75	466	1.99	4.28	—115%	70	408	1.86	3.75	—102%	118	477	3.14	4.38	—40 %	21	214	0.56	1.97	—252%
55–64	44	515	2.76	9.10	—230%	53	414	3.32	7.32	—120%	100	446	6.26	7.88	—26 %	23	245	1.44	4.33	—201%
65 and over	63	738	8.42	26.06	—221%	65	505	8.69	17.83	—105%	117	560	15.64	19.80	—27 %	16	204	2.14	7 20	—236%
Total	391	2505	0.94	1.99	—112%	428	1936	1.03	1.54	—50 %	1602	4736	3.86	3.76	—3 %	83	839	0.20	0.67	—223%
FEMALES.																				
Under 5 years	11	67	0.21	0.46	—119%	25	26	0.48	0.18	— 63%	876	1798	16.91	12.40	—36 %	..	..	..	..	..
5–9	18	34	0.41	0.27	— 34%	10	13	0.23	0.10	— 57%	38	57	0.85	0.45	—47 %	..	..	..	..	..
10–14	10	42	0.25	0.39	— 56%	6	11	0.15	0.10	— 33%	10	24	0.25	0.22	—11 %	5	23	0.02	0.04	—100%
15–19	9	60	0.19	0.58	—210%	8	16	0.17	0.16	— 6%	19	43	0.40	0.42	— 5 %	..	..	..	..	..
20–24	20	67	0.42	0.45	— 8%	29	30	0.60	0 20	— 66%	46	55	0.96	0.37	—62 %	..	..	..	..	..
25–29	23	85	0.51	0.60	— 19%	28	72	0.62	0.50	— 19%	41	67	0.91	0.47	—48 %	7	30	0.15	0.21	— 80%
30–34	30	118	0.82	1.03	— 26%	30	83	0.82	0.73	— 11%	37	110	1.01	0.96	— 5 %	16	43	0.44	0.38	— 14%
35–44	15	295	0.75	1.71	—128%	71	231	1.19	1.34	— 13%	78	224	1.31	1.30	..	45	210	0.75	1.22	— 63%
45–54	38	329	1.05	3.17	—202%	46	270	1.27	2.60	—105%	71	246	1.96	2.37	—21 %	56	336	1.54	3.24	—110%
55–64	36	466	2.12	8.03	—279%	21	285	1.24	4.91	—296%	80	386	4.72	6.65	—41 %	53	310	3.13	5.34	— 71%
65 and over	47	817	4.57	23.40	—412%	38	439	3.70	12.57	—240%	150	728	14.59	20.85	—43 %	50	241	4.86	6.90	— 42%
Total	287	2380	0.66	1.87	—183%	312	1476	0.71	1.16	—63 %	1446	3738	3.31	2.93	—11 %	232	1193	0.53	0.94	— 76%
BOTH SEXES.																				
Under 5 years	28	123	0.27	0.22	— 56%	55	81	0.53	0.28	— 47%	1783	3918	17.03	13.45	—21 %	..	..	..	..	..
5–9	30	69	0.34	0.27	— 21%	24	30	0.27	0.12	— 56%	77	126	0.86	0.50	—42 %	..	..	..	..	..
10–14	29	83	0.37	0.39	— 5%	13	15	0.16	0.07	— 56%	21	63	0.27	0.29	— 7 %	9	58	0.02	0.05	—150%
15–19	25	102	0.28	0.45	— 61%	16	28	0.18	0.12	— 33%	36	96	0.41	0.42	— 2 %	..	..	..	..	..
20–24	42	130	0.48	0.48	..	50	67	0.58	0.25	— 57%	86	160	0.99	0.59	—40 %	..	..	..	..	..
25–29	55	172	0.65	0.61	— 6%	63	146	0.74	0.52	— 30%	99	223	1.16	0 79	—32 %	9	42	0.11	0.15	— 36%
30–34	53	222	0.72	0.92	— 28%	67	187	0.91	0.78	— 14%	108	314	1.47	1.30	—12 %	20	66	0.27	0.27	..
35–44	113	653	0.95	1.77	— 86%	159	537	1.32	1.48	— 10%	202	731	1.69	1.98	—18 %	58	286	0.45	0.77	— 71%
45–54	113	795	1.62	3.74	—131%	116	678	1.66	3.19	— 92%	189	723	2.71	3.40	—26 %	77	549	1.04	2.58	—148%
55–64	80	981	2.43	8.56	—252%	74	699	2.25	6.10	—171%	180	832	5.47	7.26	—33 %	76	555	2.34	4.84	—107%
65 and over	110	1555	6.19	24.60	—297%	103	944	5.80	14.93	—157%	267	1288	15.03	20.37	—36 %	66	445	3.71	7.04	— 90%
Total	678	4885	0.80	1.92	—140%	740	3412	0.87	1.34	— 54%	3048	8474	3.58	3.33	— 7 %	315	2000	0.37	0.79	—114%

MAXIMUM MORTALITY FROM PULMONARY TUBERCULOSIS, BY SEX AND AGE-GROUPS.

Males.				Females.			Both Sexes.		
Age-groups.	1868 Deaths.	Age-groups.	1907 Deaths.	Age-groups.	1868 Deaths.	1907 Deaths.	Age-groups.	1868 Deaths.	1907 Deaths.
25–34 years ..	500	35–44 years	1087	25–34 years .	434	643	25–34 years .	934	1691
35–44 " ..	369	25–34 " .	1058	15–24 " .	344	483	35–44 " .	701	1548
15–24 " ..	301	45–54 " .	764	35–44 " .	332	461	15–24 " .	645	983
45–54 " ..	267	15–24 " .	500	45–54 " .	173	210	45–54 " .	440	974
55–64 " ..	159	55–64 " .	305	55–64 " .	119	96	55–64 " .	278	401

A qué Períodos de la edad y en que extensión se ha Manifestado la Mortalidad por Tuberculosis en la Ciudad de Nueva York, Durante los Ultimos 40 Años.—(Guilfoy.)

1. Nomenclatura de las enfermedades tuberculosas en los sesenta primeros años, comparada con las de hoy.

2. La edad constitucional de la población de la cuidad en 1865 comparada con la del presente.

3. Tuberculosis de los pulmones. A qué edad y en qué extensión ha tenido lugar la reducción en mortalidad comparando la proporción de muertos en 1868 con la de 1907.

4. Otras enfermedades tuberculosas. A qué edad y en qué extensión ha tenido lugar la reducción en mortalidad comparando la proporción de muertos en 1868 con la de 1907.

5. La edad media de muerte de tuberculosis pulmonar y de todas las enfermedades tuberculosas en 1868 comparada con la de 1907.

Mortalité due à la tuberculose dans la ville de New York pendant les dernières 40 années au point de vue de l'âge.—(Guilfoy.)

1. Nomenclature des maladies tuberculeuses en usage d'environ 1860 à 1870; comparaison à celle d'aujourd'hui.

2. Composition de la population selon l'âge en 1865, comparée à celle d'aujourd'hui.

3. Tuberculose pulmonaire. A quels âges et en quelle mesure la réduction de la mortalité a-t-elle eu lieu. Comparaison des chiffres de 1868 à ceux de 1907.

4. Autres maladies tuberculeuses. A quels âges et en quelle mesure la réduction de la mortalité a-t-elle eu lieu. Comparaison des chiffres de 1868 à ceux de 1907.

5. Âges moyens des cas de mort due à la tuberculose pulmonaire et des cas de mort due à toutes les maladies tuberculeuses en 1868, comparés à ceux de l'année 1907.

Zu welchen Altersperioden und in welchem Masse hat die Sterblichkeitsrate an Tuberkulose sich während der letzten vierzig Jahre in der Stadt New York bemerkbar gemacht?—(GUILFOY.)

1. Nomenclatur der tuberkulösen Erkrankungen in den Sechziger Jahren; Vergleich mit jenen von heute.

2. Die Alterszusammensetzung der Bevölkerung der Stadt im Jahre 1865 verglichen mit der von heutzutage.

3. Lungentuberkulose. In welchen Altersstufen und in welchem Masse hat die Verminderung der Sterblichkeit stattgefunden beim Vergleiche der Todesraten von 1868 mit denen von 1907?

4. Andere tuberkulöse Erkrankungen. In welchen Altersstufen und in welchem Masse hat die Verminderung der Sterblichkeit stattgefunden beim Vergleiche der Todesraten von 1868 mit denen von 1907?

5. Durchschnittsalter von Todesfällen bei Lungentuberkulose und von allen tuberkulösen Erkrankungen im Jahre 1868 verglichen mit jenen von 1907.

DISCUSSION.

WALTER F. WILLCOX: Dr. Guilfoy has pointed out several interesting indications from a comparison of the New York city statistics of 1868 and 1907. Perhaps the most important, and certainly the most interesting to me, is the evidence that the decrease in tuberculosis among females has been nearly twice as rapid as among males. To explain this difference he has offered several suggestions. Let me offer another, which seems to me somewhat more probable than any he has suggested. As was pointed out by Dr. Newsholme in his brilliant lecture Tuesday evening, the decrease of tuberculosis in European countries and cities has occurred, as a rule, wherever there has been an increase in the segregation of advanced cases, and nowhere else. Such an increase in segregation has certainly been going on in New York city. This change, I believe, has been a greater protection to women than to men. For if a person dying of consumption is being cared for at home, the nurse is almost sure to be a woman. The removal of such a case to the hospital or other institution therefore tends to protect women more than men.

This explanation seems to be supported by two facts: First, the greater decrease of tuberculosis among women is not confined to New York city,

but occurs in nearly all places where a decrease in the total rate is found, and is thus almost, if not quite, coextensive with the area showing an increasing segregation of advanced cases. Secondly, the figures for New York city show that the greater decrease is almost confined to women at least twenty-five years of age, and so old enough to assist as nurses in the care of advanced cases of tuberculosis.

May I pass from a discussion of Dr. Guilfoy's paper to the general topic of the meeting this morning? We have heard from a distinguished justice of the Supreme Court that the Constitution does not permit any limitation upon the hours of labor permissible to men, but he has also pointed out a most important qualification of this position. If labor for long hours in a given occupation can be shown to be unhealthful and injurious to the general population, then such a law may be held constitutional under the police power. What is needed, then, to reconcile public opinion in certain States as reflected in the laws they have enacted with the provision of the Constitution of the United States, is trustworthy evidence regarding the healthfulness of an occupation. That we do not have in this country at the present time.

Let me give two illustrations. Several years ago the Anthracite Coal Strike Commission had to face the question what was a reasonable wage for miners of hard coal in Pennsylvania. This is dependent largely upon the healthfulness of the occupation and the probable working lifetime of the miner. The only statistical evidence they could secure was that regarding the prevalence of accidents in coal mines. From this they concluded that coal mining was a dangerous, but not the most dangerous, occupation. Yet the total healthfulness of an occupation is slightly affected by its death-rate from accidents. The English figures regarding coal miners show that the death-rate from accidents is indeed high, but that the death-rate from tuberculosis is so extremely low as to more than offset the other influences tending to a higher death-rate. This is so marked that one of the leading English statisticians has suggested that coal-dust may have an antiseptic influence.

Perhaps a more important case was that of the law recently passed in New York State limiting the hours of workers in bakeshops of New York City to ten. By a majority of one the Court of Appeals of New York State decided that the medical evidence and opinions cited warranted one in concluding that this occupation was conspicuously unhealthful, and therefore the law was constitutional as a protection to public health. An appeal being taken to the Supreme Court of the United States, that body, also by a majority of one, reversed the highest court of New York, deciding that the evidence submitted did not warrant the conclusion that the occupation of a baker in New York city was conspicuously unhealthful, and that the law in consequence was unconstitutional and void.

It should be noticed that the question which these courts were compelled to pass upon is essentially a question of medical statistics and a question of fact. One who examines the evidence in detail must conclude, I think, that no one can tell with certainty whether this occupation is healthful or unhealthful, and that we never shall know until some adequate statistical basis for a conclusion is laid. It is most unfortunate for the reputation of our learned judiciary that they should be asked and compelled to pass upon points which are not strictly points of law at all, and upon which they cannot claim to be competent experts. The antagonism between their decisions and the public opinion of the community injures their reputation. We surely need some adequate method for securing a greater body of evidence and a better unanimity of opinion as to what are the most healthful occupations under present conditions in the United States. This can be secured only by the gradual building up of an effective and adequate system of statistics of death-rates by occupations.

SECTION VI.

State and Municipal Control of Tuberculosis (*Continued*).

NINTH SESSION.

Friday Afternoon, October 2, 1908.

TUBERCULOSIS IN THE ARMY AND NAVY. TUBERCULOSIS IN CERTAIN PLACES.

Section VI was called to order by Dr. Juan J. Ulloa, of Costa Rica, on Friday afternoon, October 2, at half-past two o'clock.

DIE BEKÄMPFUNG DER TUBERKULOSE IN DER DEUTSCHEN ARMEE.

VON STABSARZT DR. SAAR,
Berlin.

Das Thema "die Bekämpfung der Tuberkulose in der deutschen Armee" ist Ihnen als Gegenstand einer Arbeit des Oberstabsarztes v. Schultzen vielleicht bekannt aus der deutschen Tuberkulosekongress-Gedenkschrift, die dem 1905 in Paris tagenden internationalen Tuberkulosekongress seitens des deutschen Zentralkomitees überreicht wurde. Im Jahre 1906 hat sodann Herr Stabsarzt Dr. Fischer auf Grund von über 11,000 Zählkarten die Lungentuberkulose in der Armee in einer Monographie bearbeitet.

Wenn ich trotzdem zu obigem Thema kurz das Wort ergreife, so ist es darum, weil immerhin ein kurzer Ueberblick über die zur Bekämpfung der Tuberkulose getroffenen Massnahmen in einem so grossen und gut organisierten Betriebe, wie ihn das deutsche Heer mit seiner Kopfstärke von gegen 600,000 Mann darstellt, für Manchen von Interesse sein dürfte, und weil ferner die Statistik beweist, dass unsere Medizinalverwaltung mit ihren Massnahmen auf dem richtigen Wege ist.

Zum Beweise dessen möchte ich nur kurz vergleichsweise die Zahlen anführen, die die Sanitätsberichte des Jahres 1905–06 sowie des Jahres 1885–86 geben über den Zugang an Tuberkulose insgesammt, den Zugang an Lungentuberkulose und der Zahl der Todesfälle durch Lungentuberkulose in der Armee. Diese beiden Jahrgänge habe ich deswegen herausgegriffen, weil der Sanitätsbericht 1905–06 der neueste, zur Verfügung stehende war und der über 1885–86, welcher 20 Jahre zurückliegt, schon unter dem klärenden Einfluss der Koch'schen Entdeckung des Tuberkelbazillus steht. Bei dieser Gegenüberstellung ergiebt sich Folgendes: Die absoluten Zahlen auf 100,000 der Kopfstärke umgerechnet, sind folgende:

I. 1885–86 betrug der Gesammtzugang an Tuberkulose 330 Mann (auf 100,000), 1905–06 dagegen 190 Mann (auf 100,000), d. h. Abnahme um 42 %.

II. Der Zugang an Tuberkulose der ersten Luftwege und der Lungen betrug 1885–86 230 Mann (auf 100,000), 1905–06 150 Mann,—Abnahme um 35%.

III. Es starben an Lungenschwindsucht 1885–86 67 Mann (auf 100,000), —29% der Erkrankten; 1905–06 jedoch nur 12 Mann (auf 100,000)—8% der Erkrankten. Wir haben somit eine Herabsetzung der Mortalität an Lungentuberkulose um 72%.

Das Schwergewicht der Tuberkulosebekämpfung in der Armee liegt naturgemäss auf prophylaktischem Gebiet. In dieser Hinsicht gilt es bei der Musterung und Aushebung der Heerespflichtigen mit allen nur möglichen Mitteln die zur Tuberkulose disponierten, bezw. im Beginn der Erkrankung befindlichen Leute herauszufinden. In diesem Bestreben wurde die Höchstzahl der bei der Musterung an einem Tage zu untersuchenden Leute von 250 auf 150 herabgesetzt. Auf Vorgeschichte hinsichtlich der Eltern und Geschwister wie auch auf eigene überstandene tuberkuloseverdächtige Erkrankungen besonderer Wert gelegt. Auf Grund eines reichhaltigen Zählkartenmaterials stellte daher Fischer die Forderung auf, dass das Zusammentreffen des bewiesenen Vorhandenseins der Tuberkulose in der direkten Anwendung mit der Tatsache einer bestandenen tuberkuloseverdächtigen Erkrankung bei entsprechender Körperbeschaffenheit als Ausmusterungsgrund zu betrachten sei.

Die bei der Musterung auf Tuberkulose der Athmungsorgane hinweisenden Momente sind als körperliche Besonderheiten zunächst schon bei der Besichtigung des völlig entkleideten Mannes zu beachten. Es wird also zu achten sein auf eingesunkene Ober- und Unterschlüsselbeingruben, länglichen Bau des Brustkastens, flügelartig abstehende Schulterblätter, dünne, schräg verlaufende Rippen, durchsichtige, weisse Haut, Pityriasis (Kleienausschlag). Auch eine Costa decima fluctuans, die nach Stillers umfassenden Untersuchungen als Stigma für den Habitus asthenicus aufzufassen ist, kann durch einen Griff festgestellt werden. Die Anamnese, deren Fragen

zweckmässig den Leuten bereits im Entkleidungsraum zuvor mitzuteilen sind, erstreckt sich hinsichtlich der Tuberkulose auf Eltern, Geschwister und bei den zu Untersuchenden selbst ausser auf überstandene Lungenkrankheiten auch auf vorausgegangene Grippe, Typhus, Masern. Berufstätigkeit und Lebensweise müssen berücksichtigt werden, etwa bestehende Krankheits. zeichen, wie Auswurf, Nachtschweisse, Fieber, Blutspeien, auch Magenstörungen fordern zur genauen Untersuchung der Lungen auf. Man lässt jetzt einige tiefe Athemzüge tun, achtet darauf, ob beide Brusthälften sich gleich gut ausdehnen, ob Hüsteln auf der Höhe der Einathmung erfolgt. Bei der Beklopfung der Lungen sind nicht nur Dämpfungen, sondern auch die Lungengrenzen festzustellen. Bisweilen findet sich perkussorisch als erstes Zeichen beginnender Infiltration eine Schalldifferenz in den Gruben zwischen den beiden Köpfen des Sternocleido-mastoideus.

Bei der Behorchung ist besonders zu beachten das verlängerte und verschärfte Ausathmungsgeräusch über den Lungenspitzen. Verdächtig ist das sogenannte abgesetzte (saccadierte) Athmen, auch unbestimmtes, abgeschwächtes, zögernd nachschleppendes Athmen ist zu beachten. Diagnostisch wertvoll ist—falls vorhanden—das sogenannte Burghart'sche Zeichen, inspiratorisch feines hörbares Knisterrasseln in der vorderen Axillarlinie in Höhe der unteren Lungengrenze. Die Befunde werden in den Listen sorgfältig notiert.

Bei der Musterung festgestellte manifeste Erkrankung an Tuberkulose hat ausser völliger Ausmusterung nach neuerer Bestimmung Fürsorgeüberweisung in Folge Anmeldung durch den Zivilvorsitzenden der Musterungskommission zur Folge.

Das zweite Sieb vor der Einstellung stellt die ungefähr drei Monate nach der Musterung vor sich gehende Aushebung vor. Bei dieser werden noch bisweilen Leute ausgemustert, die teils in der Zwischenzeit erkrankt sind, teils wegen Schwächlichkeit dem Militärarzt auffallen, oder bis zu diesem Termine Bescheinigungen über ihre behaupteten Vorkrankheiten beigebracht haben.

Trotz alledem wird es in absehbarer Zeit nicht gelingen, alle mit latenter Tuberkulose Behafteten von der Einstellung fernzuhalten. Neben dem mit dem Untersuchungsgeschäft verbundenen Geräusch, das eine genaue Untersuchung der Lungenspitzen sehr erschwert, kommen als Grund hiefür die mangelhaften, bezw. falschen Angaben hinsichtlich der Vorgeschichte in Betracht, die in Deutschland besonders bei Freiwilligen veranlasst werden durch den Wunsch, für den Militärdienst als tauglich befunden zu werden. Die wichtige Aufgabe der Aussonderung tuberkuloseverdächtiger Leute fällt daher dem Truppenarzt gelegentlich der Einstellung zu. Dieser verfügt über die nötige Zeit, entsprechende Untersuchungsräume und ist in der Lage, in zweifelhaften Fällen die neueren diagnostischen Hilfsmittel für die Frühdiag-

nose der beginnenden Lungentuberkulose anzuwenden. In dieser Hinsicht erinnere ich nur an den Nutzen der Röntgendurchleuchtung, die in allen grösseren Lazaretten vor sich gehen kann, das William'sche Symptom, die Krönig'sche Methode der Spitzenperkussion, die Auskultation der Lungenspitzen nach vorheriger leichter Massage, sowie die Anwendung der subkutanen oder conjunktivalen diagnostischen Tuberkulinprobe. Ueber die praktische Brauchbarkeit und den Wert der letzteren möchte ich mich—wenn auch mit Vorbehalt—günstig aussprechen. Bei täglich frischer Herstellung der Alttuberkulinlösung haben wir auf der Kraus'schen Klinik in hunderten von Fällen ausser einige Male Phlyktänenbildung nie eine Schädigung gesehen. Dabei ist es selbstverständlich, dass man nur bei ganz reizlosen, gesunden Augen einträufelt. Auch bei akuten Rhinitiden ist nach Görlich's Erfahrung Einträufelung kontraindiziert. Wenn Collin bei Anwendung dieser Probe fürchtet, dass durch Reiben des Auges eine Reaktion vorgetäuscht würde, so ist meines Erachtens dieser Gefahr unschwer dadurch zu begegnen, dass das zweite Auge einen Tropfen physiologischer Kochsalzlösung erhält. Es gilt in der deutschen Armee der Grundsatz, möglichst die Entscheidung über die Dienstfähigkeit unmittelbar nach der Ankunft der Rekruten herbeizuführen, ohne erst zu dem Mittel der versuchsweisen Einstellung um den Heeresdienst zu greifen. Immerhin wird eine Anzahl Leute vorhanden sein, bei denen die Diagnose auf beginnende Tuberkulose nicht gestellt werden kann. Sie kommen auf die Beobachtungsliste. Auf dieselbe Liste kommen späterhin Leute, die während ihrer Rekrutenausbildung an Gewicht abnehmen. Letztere werden, wenn die Untersuchung im Revier objektive Zeichen einer Erkrankung nicht erkennen lässt, zweckmässig zur Beobachtung dem Garnisonslazarett überwiesen, wo naturgemäss das Hauptgewicht auf den Nachweis einer latenten, bezw. beginnenden Tuberkulose gelegt werden muss. In dieser Hinsicht möchte ich neben der Lungentuberkulose an beginnende Nierentuberkulose erinnern und als Frühsymptom, das noch nicht allgemein bekannt ist, das Auftreten von Cylindrurie ohne gleichzeitige Albuminurie erwähnen, das mir selbst zweimal die Diagnose beginnender Nierentuberkulose zu stellen gestattet hat. Die subkutane, diagnostische Tuberkulinprobe wird bei uns prinzipiell nur im Lazarett vorgenommen und nur, wenn dreistündliche Messung drei Tage lang im Werte über 37 Grad (axillar) ergeben hat. An Tuberkulose erkrankte Soldaten werden sofort dem Garnisonslazarett überwiesen. Die Desinfektion ihrer Kleidungsstücke und Bettwäsche erfolgt gleichfalls im Lazarett, die Desinfektion der Stube, auf der sie gewohnt haben, dürfte davon abhängig gemacht werden, ob sie Tuberkelbazillen mit dem Auswurf ausscheiden oder nicht. Ist Tuberkulose festgestellt, so wird sofort das Entlassungsverfahren eingeleitet, die Leute werden bis zu ihrer Entlassung im Lazarett behalten und in grösseren Lazaretten mit besonderen Tuberkuloseabteilungen, in kleineren

in Extrazimmern untergebracht. Die Einrichtungen unserer Lazarette gestatten zur Behandlung der Tuberkulose die Anwendung der dietätischen, medikamentösen, hydrotherapeutischen und der spezifischen Behandlung; jedoch wird letztere nur mit ausdrücklicher Einwilligung des Kranken begonnen und dann meist nur bei Unteroffizieren, die längere Zeit in Behandlung bleiben. In einigen, klimatisch besonders günstig gelegenen Lazaretten (München, Detmold, Hann, Minden, Saarbrücken) sind besondere Stationen für tuberkulöse Lungenkranke eingerichtet, die mit Liegehallen, Tageräumen, Räumen für Massage, und für hydrotherapeutische Massnahmen ausgestattet sind. Längere Sonderkuren kommen nur für Unteroffiziere in Betracht, bei denen die Wiederherstellung der Garnisonsdienstfähigkeit angestrebt wird. Diese werden auch, und mit gutem, Erfolge in das an der Nordsee gelegene Militärkurhaus zu Norderney geschickt.

Nach dem Ausscheiden aus dem Heeresdienst erhalten die Tuberkulösen bei bestehendem Versorgungsanspruch Pension, die sich in ihrer Höhe nach der Länge der Dienstzeit und dem Grade der Erwerbsfähigkeit richtet.

Ferner können jährlich eine Anzahl tuberkulöser Invaliden auf Reichsfond längere Kuren in Lungenheilstätten bewilligt erhalten.

Für Offiziere und Sanitätsoffiziere besteht seit dem Jahre 1901 als Heilanstalt für beginnende Lungentuberkulose ein Genesungsheim in Arco (Südtirol), ein Geschenk des deutschen Kaisers. Es bietet für 25 Kurgäste Raum, ist mustergültig eingerichtet und von Oktober bis Mai geöffnet. Um Rekonvaleszenten nach schweren inneren Krankheiten, die früher häufig in die Heimat beurlaubt wurden, eine gesicherte Rekonvaleszenz zu bieten und die in dieser Zeit erhöhte Disposition für Tuberkulose zu bekämpfen, bestehen in der deutschen Armee Genesungsheime (zur Zeit 13 mit über 700 Betten), die ihren Zweck glänzend erfüllen.

Auch für Unteroffiziersfrauen und -kinder kann zur Zeit durch Aufenthalt in Genesungsheimen im Gebirge und an der See, die privater Wohltätigkeit ihre Entstehung und der Medizinalabteilung ihre ärztliche Versorgung verdanken, manches auf dem Gebiet der Verhütung tuberkulöser Erkrankungen geschehen.

Dies sind in kurzem die Grundzüge, nach denen in unserer Armee die Verhütung und Bekämpfung der Tuberkulose vor sich geht. Sie basieren auf der grundlegenden Koch'schen Entdeckung des Tuberkelbazillus als Erreger der Tuberkulose und tragen dem infektiösen Charakter der Tuberkulose voll Rechnung. Dass bei der Durchführung dieses Gesichtspunktes die hygienischen Massnahmen hinsichtlich Staubverhütung, Abfallbeseitigung, Spuckverbot, Ventilation eine grosse Rolle spielen, ist selbstverständlich. Sind doch Sonnenlicht und Reinlichkeit unsere grössten Bundesgenossen im Kampf wie gegen die Infektionskrankheiten überhaupt, so auch insbesonders gegen die Tuberkulose. Daher hat, um nur neuere Massnahmen noch kurz

zu erwähnen, die Verwendung von staubbindenden Oelen in den Bureaus, und in letzter Zeit auch für die Fussböden der Exerzierhäuser an Umfang zugenommen. Für die Körperpflege der Soldaten sind ferner neben den, das ganze Jahr benutzbaren Brausebädern, Licht- und Sonnenbäder, wenigstens in den Garnisonen, in denen es im Sommer an Badegelegenheit im Freien fehlt, versuchsweise eingeführt. Auch Vorschläge vor dem Dienst, morgens nach dem Aufstehen einige Minuten Nacktgymnastik zur Abhärtung der Haut zu treiben, sind gemacht worden. Eine Möglichkeit, Infektionskeime in die Kasernements einzuschleppen bilden auch jetzt noch in den Kasernen—wenn auch meist in besonderen Unteroffizierfamilienwohnhäusern—wohnender Familienangehörigen der Unteroffiziere und Kasernenunterbeamten. Um auch diese Möglichkeit der Einschleppung von Tuberkuloseherden in die Kasernements zu verhindern, wäre meines Erachtens bei Verheiratung von Unteroffizieren ein Gesundheitsattest der Braut seitens der Militärverwaltung zu fordern. Auch die im Kantinenverkaufsbetrieb beschäftigten Personen müssten durch ärztliches Attest ihre Gesundheit nachzuweisen haben.

The Prevention of Tuberculosis in the German Army.—(SAAR.)

In the German army tuberculosis has gradually diminished by about 42 per cent. during the past twenty years (from 3.3 per thousand to 1.9 per thousand of the effective force). During the same time there has been a reduction of 35 per cent. (2.3 per thousand to 1.5 per thousand of the effective strength) in the cases of tuberculosis of the upper air-passages and of the lungs.

The guiding principles in the prevention of tuberculosis in the German army have been as follows:

1. Refusal to accept prospective recruits suspected of tuberculosis. When there are positive signs of tuberculosis associated with a history of a former illness of a suspected tuberculous nature, and a corresponding physique (habitus paralyticus, thorax piriformis, floating tenth rib), this is to be regarded as a cause for rejection.

2. In case recruits suspected of tuberculosis have been enlisted, they should be carefully examined by means of the newer diagnostic methods (*x*-ray, subcutaneous and conjunctival (tuberculin tests), and tuberculosis is discovered, the men should at once be discharged.

3. If a recruit during his formative period steadily loses weight, his lungs should be carefully examined for tuberculosis, and under certain circumstances the man should be kept under observation in the hospital.

4. Tuberculous soldiers should be kept in hospital until the time of their discharge from the army. If possible, they should be treated in special tuberculosis wards.

5. There are two other precautions that would contribute to the prevention of tuberculosis:

(*a*) The systematic prevention of dust and precautions against catching cold.

Dust is prevented by sprinkling the floors of offices and armories with a dust-binding oil (dustless oil, Westrumit).

Colds may be prevented by hardening the men by means of regular douching, and the introduction of so-called naked gymnastics in the morning after rising, the establishment of light- and sun-baths, at least in barracks where there is no opportunity for bathing in the open air.

(*b*) By avoiding the introduction of tuberculosis into the barracks by the families of non-commissioned officers, etc. If a non-commissioned officer desires to marry, he should be obliged to furnish a medical certificate of his prospective bride. Persons engaged in the canteen traffic must show a medical certificate that they are free from tuberculosis.

La prevención de la tuberculosis en la Armada Alemana.—(SAAR.)

En la Armada Alemana la tuberculosis ha disminuido en cerca de un 42% durante los ultimos veinte anos, (de un 3.3 por mil a 1.9% por mil de las fuerzas efectivas). Durante el mismo tiempo ha habido una reducción de un 35% (2.3 por mil a 1.5% por mil de las fuerzas efectivas), en los casos de tuberculosis de la parte superior del aparato respiratorio y de los pulmones.

Las guias principales en la prevención de la tuberculosis en la Armada Alemana son las siguientes:

1. Rehusar la admision de los reclutas sospechosos de tuberculosis. Cuando existen signos positivos de tuberculosis con una historia sospechosa de enfermedades de naturaleza tuberculosa y un físico correspondiente (habitos paraliticos, torax piriforme, la decima costilla flotante), esto es conciderado como una causa para no ser admitido.

2. En los casos en que las reclutas sospechosos han sido admitidos, estos son examinados por medio de los métodos mas modernos, (los rayos X, la prueba subcutanea y oftálmica de la tuberculina), y si la tuberculosis se descubre al soldado se le da inmediatamente de baja.

3. Si un recluta, durante su periodo de formación, perdiere constantemente de peso, sus pulmones son cuidadosamente examinados, y bajo ciertas circunstancias el soldado es guardado bajo una constante observación en el hospital.

4. Los soldados tuberculosos son guardados en el hospital hasta el tiempo

de su baja. Si posible, éllos son tratados en las salas especiales para los tuberculosos.

5. Hay otras dos precauciones que contrubuyen a la prevención de la tuberculosis, estas son:

(*a*) La prevención sistemática del polvo en la oficina y en los cuarteles por medio de la irregación de aceite en el suelo, y por medio de guardarse contra los refrios.

(*b*) El aumento de la resistencia por medio de las duchas y la introducción de los ejercicios gimnásticos con el cuerpo desnudo en la mañana al levantarse, el establecimiento de baños de aire y sol, a lo menos en los cuarteles en donde no hay oportunidad de bañarse al aire libre; evitando la introduccion de la tuberculosis en los cuarteles por las familias de los oficiales no comisionados, etc. Si un oficial no comisionado desea casarse, éste deberá presentar el certificado de Salud a la novia firmado por un medico. Las personas empleadas en el tráfico de la cantina deberán presentar un certificado del médico de que estan libres de la tuberculosis.

DISCUSSION.

Col. George E. Bushnell (Fort Bayard, New Mexico): Dr. Saar is to be congratulated on the remarkably good showing which is made by the German army with respect to the incidence of tuberculosis in recent years. The weighing of soldiers, particularly of suspects, is much to be commended, as not only a simple, but also a very effective, means of detecting cases likely to prove to be tuberculous.

The admission rate for tuberculosis of the army of the United States stands between that of Germany and France, more nearly approaching the latter. The ratio per thousand of mean strength of admissions for pulmonary tuberculosis was, from 1898 to 1904 inclusive, 4.34; for 1906, 4.50. The ratios of admission for this disease were declining before the Spanish War. Thus the ratio in 1896 was 1.59; for 1897, 1.97. In 1898 it increased to 2.77, and since that year it has always been more than 4 per 1000. It is quite apparent that the increase was coincident with the entrance of the army into tropical service, and there can be no doubt that such service has played an important part in the increase of pulmonary tuberculosis. A comparison between the statistics of this disease in the Philippines and in the United States does not, however, show the difference in favor of the cooler climate that might be expected. The Philippine scouts showed in 1906 a ratio of 8.62 per thousand. This is the only organization from which statistics are available which serves continuously in the tropics. As it is made up, however, of Filipinos, the difference in race must be allowed for. The colored troops show a much greater susceptibility to pulmonary tuberculosis than the

whites, their admission ratio for 1906 being 7.51 per thousand. A marked difference between the German and the American army is to be found in the mode of recruitment. Whereas the German army is composed of the flower of the nation's youth, the American army, in which enlistments are voluntary, is obliged to come into competition with the inducements offered by civil life. When the country is prosperous, it is extremely difficult to obtain the material desired. The recruiting officers are often forced to accept relatively undesirable recruits for lack of better. Fischer* ascribes the higher rates of the French army to a similar cause; that is, the quota demanded yearly from the stationary population is so great that it is necessary to accept men of defective physique. Another reason for the relatively high rate of the American army must be sought in defective physical examinations. Recruited, as our army is, over a vast territory, it is necessary often to employ physicians whose qualifications cannot be well known. There has been so much complaint of the poor quality of recruits that it has recently been ordered that all recruits before final acceptance shall be reëxamined by medical officers of the army. It is hoped that this provision will lead to improvement, but the change is so recent that its effect has not yet become apparent in the statistics.

In conclusion, I desire to state my strong conviction that the development of pulmonary tuberculosis is not due to any appreciable extent to defective hygienic conditions in our army, but almost entirely to the enlistment of men already affected with masked tuberculosis.

* "Die Lungen-Tuberkulose in der Armee."

DIE TUBERKULOSE UND IHRE BEKÄMPFUNG IN DER KAISERLICH-DEUTSCHEN MARINE UND IN DEN DEUTSCHEN SCHUTZGEBIETEN.

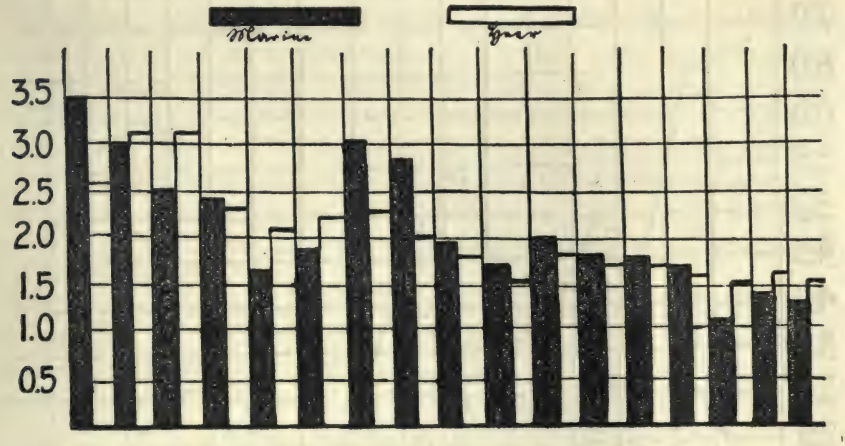
Von Oberstabsarzt Dr. Kirsch,
Berlin.

Während vor etwa 20 Jahren die Erkrankungsziffer an Tuberkulose in der kaiserlich-deutschen Marine noch ziemlich hoch war, ist in den letzten Jahren ein erheblicher Rückgang der Tuberkulose zu verzeichnen.

Es erkrankten auf 1000 Mann in den Jahren 1889–90, 1905–06:

	1889 –90	1890 –91	1891 –92	1892 –93	1893 –94	1894 –95	1895 –96	1896 –97	1897 –98	1898 –99	1899 –00	1900 –01	1901 –02	1902 –03	1903 –04	1904 –05	1905 –06
An Tuberkulose überhaupt	4.3	4.6	3 4	3.3	2.5	2.7	3.7	4.0	2.5	1.9	2.1	2.1	2.4	2.2	1.8	1.8	1.6
An Lungentuberkulose..	3.5	3.0	2.5	2.4	1.6	1.8	3.0	2.8	1.9	1.7	2.0	1.8	1.8	1.7	1.1	1.4	1.3

Vergleicht man den Zugang an Tuberkulose in der kaiserlichen Marine mit dem im deutschen Heere, so ergiebt sich Folgendes:



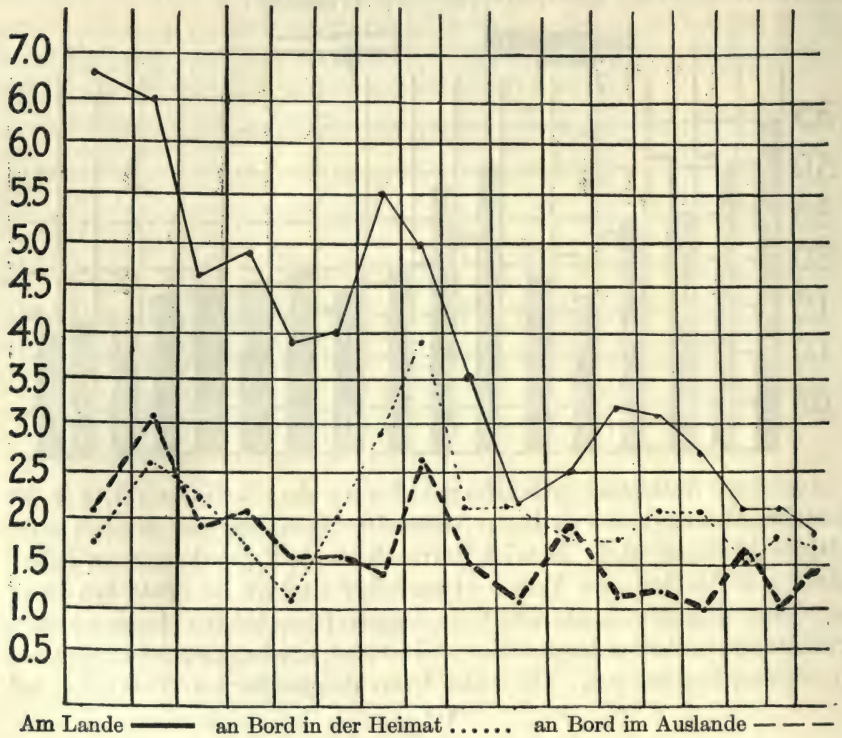
Aus diesen Zusammenstellungen geht hervor, dass die Tuberkulose in der deutschen Marine ebenso wie in der Armee eine allmählige, aber deutlich nachweisbare Abnahme zeigt. Dass im Durchschnitt die Erkrankungen an Tuberkulose in der kaiserlichen Marine etwas höher sind, als im deutschen Heer, liegt daran, dass klimatische und Witterungseinflüsse bei der Marine häufiger Erkältungskrankheiten hervorrufen und so auch häufiger den Ausbruch einer Tuberkulose begünstigen. Die hohe Erkrankungsziffer an Tuberkulose bei

der Marine in den Jahren 1889–91 stand mit einer Influenzaepidemie und die Steigerung an Erkrankungen an Tuberkulose in den Jahren 1895–96 mit den schroffen Witterungsverhältnissen der Winter während dieser Jahre in Zusammenhang, in denen in Folge der nasskalten Witterung auch sehr zahlreiche Bronchialkatarrhe und Lungenentzündungen zur Behandlung kamen. Bemerkenswert ist die Tatsache, dass der Zugang an Tuberkulose bei den Marineteilen am Lande am höchsten war, und zwar waren die Marineteile der Ostseestation durchschnittlich mehr beteiligt (5.3%), als die der Nordseestation (4.5%). Weniger zahlreich als am Lande war der Zugang an Tuberkulose an Bord in den heimischen Gewässern und am geringsten an Bord im Auslande, wie nachfolgende Tabelle zeigt:

Es erkrankten auf 1000 Mann in den Jahren 1889–90, 1905–06:

	1889 –90	1890 –91	1891 –92	1892 –93	1893 –94	1894 –95	1895 –96	1896 –97	1897 –98	1898 –99	1899 –00	1900 –01	1901 –02	1902 –03	1903 –04	1904 –05	1905 –06
Am Lande ...	6.8	6.5	4.6	4.9	3.9	4.0	5.5	5.0	3.5	2.2	2.5	3.2	3.1	2.7	2.1	2.1	1.9
An Bord in der Heimat	1.8	2.6	2.3	1.7	1.1	2.0	2.9	3.9	2.2	2.2	1.8	1.8	2.1	2.1	1.5	1.8	1.7
An Bord im Auslande ..	2.1	3.1	1.9	2.1	1.6	1.6	1.4	2.7	1.5	1.1	1.9	1.2	1.3	1.0	1.6	1.0	1.4

Eine zeichnerische Darstellung dieser Ziffern giebt folgendes Bild:



Der Grund der höheren Erkrankungsziffer an Tuberkulose an Land und an Bord in der Heimat ist nach den Sanitätsberichten in erster Linie auf die schroffen Witterungsverhältnisse an Land und an Bord in der Heimat zurückzuführen, in Folge derer weit mehr als an Bord im Auslande Erkältungskrankheiten auftreten, die ihrerseits die Entstehung einer Tuberkulose begünstigen. Andererseits wird man zugeben, dass die für das Ausland bestimmte Besatzung aus ausgesuchten Leuten besteht, so dass ein Teil von schwächlichen Leuten zurückbleibt.

Von den an Tuberkulose Erkrankten waren etwa 25% erblich belastet, bei 45% der Fälle fehlten nähere Angaben, während 30% als nicht erblich belastet bezeichnet wurden.

Bei etwa einem Drittel der an Tuberkulose Erkrankten bestand schon bei Beginn der Erkrankung ein phthisischer Habitus, und in einem Drittel der Fälle waren früher Erkrankungen der Athmungsorgane während der Dienstzeit und in der Zeit vor der Einstellung vorhergegangen.

Auf die verschiedenen Besatzungsteile verteilt sich die Erkrankungsziffer wie folgt:

66% der Fälle kamen im Durchschnitt auf das seemännische Personal.
19% der Fälle kamen im Durchschnitt auf das Maschinenpersonal.
15% der Fälle kamen im Durchschnitt auf Handwerker, Sanitätsmannschaften, Köche, Stewards.

Die grosse prozentuelle Beteiligung des seemännischen Personals an der Erkrankung an Tuberkulose liegt einmal daran, dass dasselbe mehr als das übrige Erkältungskrankheiten ausgesetzt ist, deren Entstehung noch obendrein durch die, Hals und Brust freilassende Uniformtracht begünstigt wird, zumal da ein grosser Teil der Mannschaft an diese Tracht nicht gewöhnt ist. Es kommt noch hinzu, dass der überwiegende Teil des seemännischen Personals von Beruf früher Fischer und Schiffer ist, von denen es feststeht, dass sie unter schlechten hygienischen Verhältnissen leben und relativ viel an Tuberkulose leiden.

Auffallend ist es, dass das Maschinenpersonal, das sehr anstrengender Tätigkeit und den Schädigungen kohlenstaubhältiger Luft ausgesetzt ist, verhaltnismässig wenig an Tuberkulose erkrankt. Vielleicht ist die Annahme gerechtfertigt, dass der eingeathmete Kohlenstaub die Lunge gleichsam gegen eine Erkrankung an Tuberkulose schütze, ähnlich wie bei den Kohlengrubenarbeitern, welche unter den industriellen Arbeitern am seltensten an Tuberkulose erkranken.

Die Frage, ob die Unterkunftsverhältnisse an Bord und in den Kasernen an der Küste für die Verbreitung der Tuberkulose unter den Mannschaften eine Rolle spielen, ist zu verneinen. Wenn schon bei der Armee nach den umfangreichen statistischen Erhebungen die Kasernen als ein Herd für die Weiterverbreitung der Lungentuberkulose nicht angesehen werden können,

so gilt das noch viel mehr für die Marine, deren grössere Hälfte der Besatzung an Bord untergebracht ist, wo die Unterkunftsräume in einem reinen und staubfreien Zustande dauernd gehalten werden können. Zahlreiche Untersuchungen haben ergeben, dass selbst der Staub der von Tuberkulösen innegehabten Schiffsräume frei von Tuberkelbazillen war. Es hat sich auch bisher eine unmittelbare Ansteckung an Bord nicht ermitteln lassen, wenn man von einigen wenigen Fällen absieht, in denen Sanitätsmannschaften bei der Pflege Tuberkulöser an Tuberkulose erkrankten. Sehr zahlreich sind dagegen die Gelegenheiten, bei denen die Seeleute im Verkehr mit der Hafenbevölkerung des In- und Auslandes der Ansteckung mit Tuberkulose ausgesetzt sind. Dass die relativ räumlich beschränkten Unterkunftsverhältnisse an Bord gewisse Gesundheitsstörungen hervorrufen, und so eine gewisse Disposition zur Tuberkulose setzen können, wird man zugeben können. Andererseits aber werden diese Nachteile wieder durch den Umstand aufgehoben, dass die Seeleute den grössten Teil des Tages im Freien zubringen.

Ebenso wie in der Armee war auch in der Marine der Zugang an Tuberkulose am häufigsten während des 1. Dienstjahres, weniger im 2. und 3. Dienstjahre, während nach dem 3. Dienstjahre wieder mehr Erkrankungen vorkommen. Die Statistik hat ferner ergeben, dass die Tuberkulose am häufigsten unter 20 und nach dem 23. Lebensjahre befällt.

Hervorgehoben sei, dass die Lungentuberkulose im Auslande im tropischen oder subtropischen Klima im allgemeinen schnell verläuft und häufig binnen wenigen Wochen zum Tode führt, nachdem sich das Bild einer floriden Phthise entwickelt hat. Der Grund dieses schnellen Verlaufes ist darin zu suchen, dass in den Tropen die Verdauungsorgane meist daniederliegen und eine roborierende Diät verhindern.

Worin besteht nun die Bekämpfung der Tuberkulose? In erster Linie kommt das Fernhalten tuberkulös disponierten Ersatzes in Betracht.

Die Voraussetzung der Tauglichkeit zum Marinedienst ist an strenge Forderungen geknüpft, welche in der Dienstanweisung zur Beurteilung der Dienstfähigkeit für die Marine festgelegt sind. Wenn trotz der strengen Vorschriften es nicht immer verhütet werden kann, dass Leute eingestellt werden, die den Krankheitskeim in sich tragen, also tuberkulös sind, so liegt es meist daran, dass die amtlichen Ermittlungen, die vor der Einstellung des Mannes zu erheben sind, bis jetzt noch sehr lückenhaft sind, und die namentlich bezüglich des aus der seemännischen Bevölkerung stammenden Ersatzes sehr genau sein müssten. Ist doch nach den Untersuchungen von Nocht die Tuberkulose unter den Seeleuten der Handelsflotte sehr verbreitet, und waren von allen in den Jahren 1888–1893 in deutschen Krankenhäusern gestorbenen Seeleuten 40% tuberkulös. Die Ursache des häufigen Vorkommens der Tuberkulose in der Handelsflotte liegt in den zu geringen An-

forderungen, welche an die Brauchbarkeit dieser Leute seitens der Kauffarteischiffe gestellt werden, in den mangelhaften Unterkunftsverhältnissen, die Gesundheitsstörungen herbeiführen müssen, in der wohl oft erst späten Erkennung der Krankheit, da Mikroskope zum Nachweis von Tuberkelbazillen fehlen und in mangelhafter Isolierung und später Entlassung des Kranken. Eine staatliche Ueberwachung in dieser Hinsicht würde, wenn sie diese Missstände beseitigte, lohnende Resultate ergeben, denn es würde die Tuberkulose in der Handelsflotte auf ein Minimum reduziert werden und so auch eine weitere Abnahme der Tuberkulose in der Kriegsmarine eintreten. Ferner aber würde eine Beseitigung genannter Missstände als weiterer Faktor im Kampfe gegen die Tuberkulose unter der Civilbevölkerung zu betrachten sein.

An dieser Stelle möchte ich die zielbewusste Tätigkeit des deutschen Schulschiffvereines besonders hervorheben, der es sich angedeihen sein lässt, einen tüchtigen Nachwuchs für die Besatzung unserer Handelsflotte heranzubilden, wofür bis jetzt zwar nur ein Schulschiff zur Verfügung steht, aber demnächst auch ein zweites in Dienst gestellt werden wird, dessen Kosten durch private Mittel gedeckt sind. Diese Bestrebungen des Schulschiffvereines finden in unseren Reederkreisen uneingeschränkte Anerkennung und im Auslande vielfach Nachahmung.

Ich komme nun zu den ärztlichen Massnahmen, die nach der Einstellung der Leute platzgreifen. Werden bei der Einstellung Leute als zweifelhaft tauglich befunden, so werden sie zunächst nur versuchsweise eingestellt. Ergiebt eine längere ärztliche Beobachtung, dass der Eingestellte den dienstlichen Anstrengungen nicht gewachsen ist, so wird derselbe als dienstunbrauchbar entlassen. Ferner werden bei den regelmässig vorgenommenen Gesundheitsbesichtigungen an Bord und an Land insbesonders die früher versuchsweise Eingestellten sowie diejenigen, die schwere Krankheiten überstanden haben, einer genaueren Untersuchung unterzogen. Besondere Untersuchungen finden sodann statt vor Antritt eines Kommandos an Bord, zum Schwimmunterricht, zum Taucherdienst, sowie vor Antritt eines längeren Auslandskommandos.

Behufs Ueberwachung des Ernährungszustandes der Seeleute werden regelmässige Wägungen vorgenommen, bei den Mannschaften des 1. Jahrganges, den Schiffsjungen, den Kadetten, ausserdem noch Messungen der Körperlänge und des Brustumfanges, wobei Tuberkuloseverdächtige leicht ermittelt werden können.

Die Kost ist reichlich und abwechslungsreich. Die allgemeine Körperpflege ist, dank der reichlichen Bade- und Wascheinrichtungen aller neueren Kriegsschiffe, eine ausgezeichnete. Die Schiffsräume sind jetzt auf allen Schiffen mit künstlichen Lüftungsvorrichtungen versehen, durch die die verdorbene Luft abgesaugt und frische Luft eingetrieben wird. Dass auch

eine peinliche Sauberkeit der Unterkunftsräume und Aufstellung von Spucknäpfen, auf ärztliche Ueberwachung der Nahrungsmittel gehalten wird, sei noch hinzugefügt.

Von einschneidender Bedeutung ist die sofortige Isolierung eines an Tuberkulose Erkrankten sowie die Desinfektion der von ihm benützten Gegenstände (Hängematte, Kleidungsstücke, Wäsche). Die Erkrankten werden so bald wie möglich dem nächsten Marinelazarett überwiesen und als dienstunfähig entlassen. Bei Erkrankungen an Bord im Auslande erfolgt unter Umständen eine Ausschiffung und umgehende Heimsendung.

Für die Diagnose werden vereinzelt Alttuberkulineinspritzungen verwendet. Die Behandlung war vorwiegend eine hygienisch-diätetische. Vielfach wurde von den Freiliegekuren Gebrauch gemacht. Mit gutem Erfolge wurde auch Guajacolcarbonat in steigender Dosis angewendet. Günstig beeinflusst wurden auch in Kiel einige mit Neutuberkulin behandelte Fälle. Mehrfach wurden Kranke vor ihrer Entlassung Lungenheilstätten überwiesen. In geeigneten Fällen kamen vor der Entlassung auch Badekuren zur Anwendung.

Eine weitere Verminderung der Tuberkulose in der kaiserlichen Marine würde durch eine Erweiterung ihrer Bekämpfung erreicht werden. Die hiefür wünschenswerten Forderungen sind am Schluss in den Leitsätzen enthalten.

Was das Vorkommen von Tuberkulose in den deutschen Schutzgebieten anbetrifft, so fehlt dieselbe leider in keiner deutschen Kolonie. In welchem Umfange die Tuberkulose bei den Eingeborenen der deutschen Schutzgebiete vorkommt, ist nicht bekannt, da statistische Ermittelungen nur über die weisse Bevölkerung und über die Schutztruppe vorliegen. Da an den Küsten aller Meere, die für den internationalen Seeverkehr in Betracht kommen, Tuberkulose vorkommt und eingeschleppt wird, so liegt es auf der Hand, dass auch nach dem Inneren der Schutzgebiete Tuberkulose eindringen und hier weiter verbreitet werden kann, zumal da die farbigen Rassen für Tuberkulose sehr empfänglich sind. So wird in Samoa, den Karolinen und in Deutsch-Neu-Guinea bei den Farbigen, namentlich den Plantagenarbeitern, die sich meist aus Chinesen, Malayen und Melanesiern zusammensetzen, Tuberkulose beobachtet, während diese bei der weissen Bevölkerung nur äusserst selten anzutreffen ist. Auch in Togo kommt die Tuberkulose, wenn auch seltener, zu Beobachtung. An der Küste von Kamerun ist die Tuberkulose einheimisch. Die Duallaleute erkranken zwar wenig, aber die aus dem Hinterlande kommenden Farbigen erkranken recht häufig an Tuberkulose. Bei den weissen Angehörigen der Kameruner Schutztruppe ist in den letzten Jahren Tuberkulose nicht vorgekommen, und bei den Europäern, deren Kopfzahl durchschnittlich 800 betrug, sind während der letzten 6 Jahre im Ganzen nur 2 Fälle von Tuberkulose zur Beobachtung

gelangt, welche aus der Heimat mitgebracht war. Selten ist die Tuberkulose in unserer grössten Kolonie, in Deutsch-Ostafrika. Sind doch in dem Berichtsjahr 1903–04 auf allen Stationen, deren farbige Bevölkerung etwas über 4 Millionen betrug, nur 10 farbige Tuberkulöse ermittelt worden, ein sehr günstiges Ergebnis. In dem gleichen Jahre starben in Preussen von 10,000 Lebenden schon allein 19.3 an Tuberkulose. In den letzten 6 Jahren ist bei den weissen Angehörigen der deutsch-ostafrikanischen Schutztruppe Tuberkulose nicht aufgetreten, bei der farbigen Schutztruppe im ganzen nur 8 Fälle. Bei einer Durchschnittsstärke der farbigen Schutztruppe von 1900 Mann beträgt daher die durchschnittliche Erkrankungsziffer für die farbige Schutztruppe Deutsch-Ostafrikas nur 0.7%. Bei der europäischen Civilbevölkerung kamen in Deutsch-Ostafrika während der letzten 6 Jahre bei einer durchschnittlichen Kopfzahl von 1500 im ganzen nur 4 Fälle von Tuberkulose vor, eine Erkrankungsziffer von 0.4%. Dank seines ausgezeichnet günstigen Klimas nimmt Deutsch-Ostafrika bezüglich des Vorkommens von Tuberkulose den letzten Platz in unseren Kolonieen ein. Nach den Berichten von Aerzten, die viele Jahre in Deutsch-Südwestafrika tätig waren, ist die Tuberkulose im inneren dieser Kolonie bei den Eingeborenen nicht beobachtet worden, während sie an der Küste unter den Farbigen vereinzelt vorkommt, wo die Tuberkulose in die Hafenorte nicht nur von landenden Europäern, sondern auch von den zahlreich aus der Liberiarepublik eingeführten Negern, die bei den Schiffsladungslöschungen beschäftigt sind, eingeschleppt werden kann. Bei der Schutztruppe ist die Tuberkulose in Friedenszeiten nicht beobachtet worden. Wenn während des letzten Krieges mehrere Tuberkulosefälle bei der deutschen Schutztruppe vorkamen, so lag dies daran, dass mit dem Feldzug kolossale Strapazen und Entbehrungen verbunden waren, welche im Vereine mit Typhus, Ruhr, Skorbut oder Malaria den Boden für den Ausbruch einer Tuberkulose vorbereiteten, deren Keim die Erkrankten aus der Heimat mitbrachten. Es sei noch erwähnt, dass bei dem relativ starken Bedarf an Streitern, der nur durch Freiwillige der einzelnen Truppenteile gedeckt werden konnte, eine allzu peinliche Auslese nicht hat vorgenommen werden können.

Die bei der weissen Civilbevölkerung von Deutsch-Südwestafrika vereinzelt zur Beobachtung gekommenen Tuberkulosefälle waren aus der Heimat eingeschleppt. Es hat sich nun gezeigt, dass die Tuberkulose bei den befallenen Leuten, obwohl sie sich zum Teil wenig Schonung auferlegten, meist überaus günstig verlief. Der Grund hiefür liegt in dem herrlichen Klima von Deutsch-Südwestafrika, in dem Erkältungskrankheiten fast unbekannt sind. Deutsch-Südwestafrika, das bis auf einen 50–100 Kilometer breiten Küstenstrich ein trockenes, bis 1600 Meter hohes Steppenhochland darstellt, ist bis auf das nördlich gelegene Owamboland subtropisch; es hat bis auf geringe Ausnahmen während der Regenzeit eine starke Sonnenbestrahlung

und selbst im Sommer eine erfrischende Abkühlung zur Nachtzeit. Dazu kommt, dass ein grosser Teil des Landes malariafrei ist. Diese hervorragenden klimatischen Vorzüge machen Deutsch-Südwestafrika zur Aufnahme von Lungenkranken besonders geeignet.

Leitsätze.

1. Die im Durchschnitt höhere Erkrankungsziffer an Tuberkulose in der kaiserlichen Marine als in der Armee ist in erster Linie darauf zurückzuführen, dass klimatische Einflüsse häufiger Erkältungskrankheiten hervorrufen als in der Armee und so mehr den Ausbruch einer Tuberkulose begünstigen.

Die Tuberkulose zeigt in der Marine ebenso wie in der Armee eine stetige Abnahme.

2. Da ein grosser Teil des Personals der Kriegsmarine sich aus früheren Angehörigen der Handelsflotte zusammensetzt, so würde eine staatliche Kontrolle der körperlichen Tauglichkeit vor Eintritt in den Dienst der Handelsflotte sowie der Unterkunftsverhältnisse an Bord der Kauffarteischiffe viel dazu beitragen, die Disposition dieses Personals zur Tuberkulose zu verringern und so auch die Erkrankungen an Tuberkulose in der Kriegsmarine zu vermindern.

3. Die amtlichen Ermittlungen vor der Einstellung der Seeleute in die kaiserliche Marine müssten noch genauer erhoben werden, als bisher. Erblich Belastete sollten nur dann eingestellt werden, wenn sie sehr kräftig sind und nicht vorher an Erkrankungen der Athmungsorgane gelitten haben. Auch Leute, die nicht erblich belastet sind, aber wiederholt an Erkrankungen der Athmungsorgane gelitten haben, wären zweckmässig nicht einzustellen.

4. Behufs Vermeidung von Erkältungskrankheiten würde es sich empfehlen, zum Schutze des Halses und der Brust eine Aenderung des Schnittes der Uniform der Seeleute ins Auge zu fassen.

Das Personal, dessen Tätigkeit sich in den unteren Schiffsräumen abspielt, ist täglich zum Dienst an Deck (Turnen, Exerzieren) heranzuziehen.

5. Die Zahl der bei der deutschen Schutztruppe zum Ausbruch kommenden Tuberkulosefälle würde vermindert werden, wenn die Angehörigen der Schutztruppe nicht wie bisher einzelnen Truppenteilen, sondern einer ständigen Kolonialtruppe entnommen würden, wo die überwachenden Organe in der Lage wären, Minderwertige rechtzeitig auszuscheiden.

LITERATUR.

Die statistischen Sanitätsberichte der kaiserlich-deutschen Marine 1889–96, 1905–06.
Dr. Metzke: Die Tuberkulose-Bekämpfung in der kaiserlich-deutschen Marine. Sonderabdruck aus der Denkschrift des deutschen Zentralkomitees zur Errichtung von Heilstätten für den internationalen Tuberkulosekongress in Paris 1905.
Denkschrift über die Tuberkulose und ihre Bekämpfung. Kaiserliches Gesundheitsamt 1903.
Medizinalbericht der deutschen Schutzgebiete 1901–1906.
Dr. Ph. Kuhn: Ist Südwestafrika zur Aufnahme Lungenkranker geeignet? Sonderabdruck aus der Berliner klinischen Wochenschrift, 1907, Nr. 6.

Tuberculosis and its Prevention in the German Navy.—(KIRSCH.)

1. The high percentage of tuberculosis in the marine as compared with the army is due to the fact that diseases due to cold are more frequent in the navy, and more favorable to the development of tuberculosis. In the navy, tuberculosis is constantly diminishing.

2. As a large proportion of the personnel of the navy is recruited from the merchant marine, governmental supervision of applicants before they are admitted to the merchant marine and inspection merchantmen will greatly assist in diminishing the disposition of the personnel to tuberculosis, and incidentally the number of those who develop the disease after they have entered the navy.

3. The official investigation should be more searching than it has been in the past. Individuals with a tuberculous family history should not be accepted unless they are unusually vigorous and have never suffered from disease of the respiratory organs. Applicants who have repeatedly suffered from disease of the respiratory organs should not be accepted.

4. In order to avoid diseases due to cold, the cut of the uniform should be modified so as to afford better protection to the throat and chest. The men whose service keeps them down in the hold should be daily brought on deck and put through gymnastic exercise.

5. The number of cases of tuberculosis developing in the countries under the protectorate of the German Empire could be very much diminished by establishing a permanent colonial branch of the service in which the authorities would be in a position to eliminate the physically unfit.

La Tuberculosis y su Prevencion en la Armada Alemana.—(KIRSCH.)

1. El crecido por ciento de tuberculosis en la Marina en comparacion con la Armada, obedece al hecho de que debido á las influencias climatologicas; enfermedades debidas al frio son mas frecuentes en la Marina, y tambien mas favorables al desarrollo de la tuberculosis. En la Marina, la tuberculosis disminuye constantemente.

2. Debido á que una gran parte del personal de la Marina son reclutas de la marina mercantil, la supervision del gobierno en cuanto á las aptitudes fisicas de los aplicantes antes de que estos sean admitidos al servicio de la marina mercantil y la inspecion de las condiciones de vida en los navios, asistira considerablemente en disminuir el numero de aquellos en los cuales se desarrolla la enfermedad despues que estos han entrado al servicio de la Marina.

3. La investigacion de los marineros debiera ser mas rigorosa que como lo ha sido hasta el presente. Individuos con una historia de tuberculosis en

la familia, no debieran ser aceptados, salvo el caso de que estos sean muy vogorosos y que nunca hayan padecido de enfermedades de los organos respiratorios. Individuos que han sufrido repetidamente de enfermedades de los organos respiratorios, no debieran ser admitidos.

4. A fin de evitar las enfermedades debidas al frio, el corte del uniforme de la marina debiera modificarse a fin de prestar mayor proteccion a la garganta y al pecho. Los hombres cuyo servicio les obliga á permanecer en las partes bajas del buque, debieran ser traidos diariamente á la cubierta y darles un ejercicio sistematico de gimnasia.

5. El numero de los casos de tuberculosis en los paises bajo el protectorado del Imperio Aleman, pudiera disminuirse considerablemente por medio del establecimiento de una rama permanente del servicio en donde las autoridades pudieran climinar a tiempo los fisicamente ineptos.

La tuberculose dans la Marine allemande et les Pays placés sous le Protectorat de l'Empire allemand: Mesures préventives.—(KIRSCH.)

1. Si la tuberculose est beaucoup plus fréquente dans la marine impériale que dans l'armée, il faut l'attribuer au fait que, grâce aux influences climatériques, les maladies causées par le froid y sont plus nombreuses et favorisent le développement de la tuberculose. Toutefois dans la marine, la tuberculose est en décroissance constante.

2. Comme une grande partie du personnel de la marine est recrutée dans la marine marchande, l'examen, par le gouvernement, de l'aptitude physique des candidats avant leur admisson dans la marine marchande et des navires marchands contribuera beaucoup à diminuer le nombre de ceux que la maladie atteindra après leur entrée dans la marine.

3. L'enquête officielle sur les matelots devrait être plus rigoureuse qu' autrefois. Il faudrait refuser ceux dont la famille a eu des tuberculeux, à moins qu'ils ne soient d'une santé particulièrement robuste et n'aient jamais souffert d'une maladie des organes respiratoires. Les candidats qui ont souffert à plusieurs reprises d'une maladie des organes respiratoires, ne devraient pas être acceptés.

4. Pour éviter les maladies dues au froid, il faudrait modifier la coupe de l''uniforme de la marine de manière à fournir une plus ample protection à la gorge et à la poitrine du matelot. Les hommes que leur service retient dans la cale du navire devraient être appelés chaque jour sur le pont et y faire quelque manœuvre ou exercise gymnastique.

5. On pourrait diminuer sensiblement le nombre des tuberculoses dans les pays de protectorat en y établissant une succursale coloniale permanente du service comme jadis.

DISCUSSION.

Dr. Henry G. Beyer (Washington): The problem involved in the campaign against tuberculosis in the navy may be divided into four parts: first, to keep tuberculosis out of the navy; second, to prevent its spread after it has gotten into the navy; third, to care for and cure those afflicted with it; and, fourth, to prevent naval men from carrying the disease back to their families and friends, after their term of service has expired and they are discharged.

1. The most important steps to be taken toward keeping the disease out of the navy, and from getting on board naval ships, must be taken by a carefully regulated system of recruiting. Every legitimate and legally permissible means should be taken to establish freedom from this disease in the newly enlisted recruits. Every means of physical diagnosis should be exploited, sputum examinations made, and the different tuberculin reactions applied in cases where the diagnosis from physical examination alone leaves the slightest doubt.

2. After tuberculous men have entered the service and have been sent on board ships, the next problem is to secure strict isolation in order to prevent their giving it to others. The danger of communicating a disease of this kind on board ship is so much greater than anywhere else that the measures to be taken require extraordinary vigilance to produce any effectual results. Not only is the danger of infection by direct communication through expectoration so much greater than anywhere else, but also the direct contact, which has become greater here than on shore, owing to the close association and to the intimate intercourse between the men. On one of my last ships the five cases of tuberculosis that occurred during my term of service of two years were all pulmonary forms of tuberculosis which had developed practically at the same time and were due to an undiscovered case of laryngeal tuberculosis of six months' standing, the other patients all being his messmates and playmates, and pointing, therefore, clearly to direct transmission by the spray produced by this case in coughing and talking. Contact is the next great danger which must be specially guarded against on board ship; food is the last.

3. The isolation and care of the tuberculous is not as easy on board ship as it is even in a modest home on shore. The tuberculous, therefore, should be removed from a ship as promptly as conditions and the whereabouts of the ship at the time will permit. It is a duty of the Navy Department to look out for its own tuberculous patients by hospitals and all possible means that have been devised for their care. The United States navy has established a splendid sanatorium at Fort Lyon, which it seems would answer all the modern requirements of such a sanatorium.

4. It is the duty of the naval medical department to care for tuberculous sailors until they are at least perfectly safe to be permitted to proceed home after their term of service has expired, in order that they may not prove bacillus-carriers and communicate the disease to their parents and friends.

Dr. Helm (Berlin) wished to add to the papers of Dr. Saar and Dr. Kirsch a few remarks on the manner in which the German authorities had found it possible to extend the benefits of the systems used in the German army and navy for the detection of early cases of tuberculosis to the entire German people. All persons who by means of the improved diagnostic facilities and the increased care in watching over recruits are found to be suffering from tuberculosis, as well as those soldiers who are dismissed on account of tuberculosis during their time of service, are cared for in this way, that they are referred to the civil authorities for their future care. In this way it is possible to come in touch with a large number of early cases which are readily amenable to treatment. This measure was instituted by an order of the Prussian Minister of War under date of December 31, 1906. Dr. Ferrière, of Geneva, made a similar proposal at the International Red Cross Congress, held at London in June, 1907, namely, that the Red Cross should care for soldiers and sailors discharged from service because of tuberculosis; whether this suggestion bore fruit is not known by Dr. Helm. Dr. Helm referred, for a more extensive review of this matter, to his report before the Seventh International Tuberculosis Conference, held in Philadelphia.

LE SPECULATION DU SOL DES VILLES ET LA CONTAGION TUBERCULEUSE. COMMENT PEUVENT AGIR LES VILLES.

M. Augustin Rey,
Architecte, Membre du Conseil Supérieur des Habitations, Paris.

Tout semble, dans l'organisation de nos existences modernes, s'opposer à donner de l'air et de la lumière aux habitants de nos grandes agglomérations.

La Tuberculose, qui est un produit presque direct du surpeuplement, et de l'entassement en hauteur des habitants qui est presque toujours la règle dans les grandes villes, nécessite de grands remèdes.

A envisager la question à un point de vue large, ce qui s'oppose le plus à la création des espaces nécessaires pour faire pénétrer la lumière et l'air dans l'habitation, c'est la spéculation effrénée qui s'est emparée du sol de la Cité.

Le terrain cher, forcément couvert au maximum de bâtiments, crée le surpeuplement, la maison à étages, la maison bloc sombre et sans air.

Le terrain bon marché permet seul la maison peu élevée gaie et claire, entourée de l'espace libre rêvé, la seule qui fasse vivre l'habitant en lui assurant partout dans sa demeure la lumière et le renouvellement constant de l'air pur.

* * * *

Ces considérations ont fait l'objet au Congrès d'Hygiène et de Démographie de Berlin du mois de Septembre 1907 d'une discussion qui a suivi la communication que nous avons faite sur ce sujet: "La speculation sur les terrains et l'hygiène dans nos grandes villes."

Nous avons montré que la vraie politique à adopter pour améliorer les conditions d'existence des citadins et pousser à la réserve d'espaces libres, est que dans l'intérêt général la Municipalité puisse avoir en sa possession le plus de terrains possibles. Quand, dans une entreprise, un groupe veut avoir la haute main sur sa direction, sur le prix du produit, il s'assure un nombre d'actions en rapport avec le but qu'il poursuit.

Ici l'autorité municipale qui représente les intérêts supérieurs de l'hy-

giène publique à un degré, à notre avis, autrement plus grand que l'état, a un intérêt capital à voir ce produit de toute première nécessité qu'est le terrain, ne pas augmenter de valeur dans des proportions déraisonnables. L'amélioration de la santé publique est le plus souvent à ce prix.

Pour parvenir à ce résultat, les Municipalités doivent:

1. Garder jalousement en leur possession tous les terrains qui leur appartiennent. Elles ne doivent jamais les vendre. Ceux qui ne lui reviennent pas à un prix élevé et ne sont pas destinés à la création pure et simple de parcs et de jardins publics, doivent être loués à des baux de très longue durée et aux prix les plus réduits pour faciliter la construction d'habitations peu élevées, entourées le plus possible d'espaces libres et permettant d'y loger à petits loyers la grande classe des travailleurs.

2. Saisir toutes les occasions qui se présentent pour augmenter leur domaine en achetant, suivant les circonstances, à bon marché, de nombreux terrains à grande surface.

Le Congrès de Berlin où les délégués de villes représentaient les intérêts hygiéniques de plus de 100 millions de citadins, vota, à la suite de notre communication, les conclusions suivantes que nous avions présentées et qui la terminaient:

"Le Congrès est d'avis:

"Que le noeud de la question des habitations économiques et hygiéniques des grandes villes, réside dans la considération du terrain.

"Qu'il lui parait de la plus haute importance, que pour combattre les effets de la speculation sur le sol des villes, les municipalités a qui incombent la defense des intérêts supérieurs de l'hygiène publique, s'assurent là la possession d'une étendue notable de terrains a bas prix pour en user au mieux suivant les circonstances particulières a chaque pays, pour l'amélioration rationnelle des conditions de l'habitation.

"Il considère que le type d'habitations qui réalise le mieux ce but est celui de la cité-jardin."

Le Congrès fut unanime, à la suite de nitre argumentation, à déclarer que le terrain, source de bien-être public pour la santé des habitants d'une ville lorsqu'il n'atteint pas à des prix trop élevés, peut devenir une source de misère sociale et d'aggravation du mauvais état de la santé publique, lorsqu'il fait l'objet de spéculations abusives.

En possédant d'importantes surfaces de terrains, dans la périphérie des villes et surtout dans leurs banlieues, comme Propriétaires au même titre que des particuliers, en les louant et en ne les vendant jamais, les Municipalités peuvent remédier ainsi peu à peu et sans violences, à ce fléau très moderne et qui va grandissant, la spéculation du sol. Non seulement elles peuvent préparer ainsi pour l'avenir une base raisonnable pour les expropriations d'utilité publique, élément le plus actif de transformation des

vieilles cités,—et ce point est de la plus haute importance si l'on songe qu' actuellement les Municipalités sont mises presque à la rançon lorsqu'elles sont obligées d'avoir recours à ces opérations,–mais elles se trouvent surtout en mesure d'assurer par ce moyen dans l'avenir des espaces libres considérables et inaliénables.

* * * *

La spéculation du sol a été enrayée en grande partie en Angleterre du fait d'une situation spéciale qui restreint le nombre de propriétaires à un chiffre très faible, si on le compare à celui existant dans les autres Nations du monde. Certaines villes n'ont souvent pas plus de deux propriétaires pour le sol qu'elles occupent: parfois même un seul. Il faut rechercher l'origine de cette situation privilégiée, dans la politique de Guillaume le Conquérant qui partagea le territoire conquis entre ses barons. Conservatrice par excellence, l'Angleterre que les révolutions n'ont pas troublée, n'a pas touché à ses traditions de propriété. Elle a su en faire comme l'axe de toute sa politique intérieure. Au point de vue de la Tuberculose elle a pu de ce fait, éviter un des grands obstacles de l'encombrement du sol des villes par des constructions trop élevées. La spéculation du sol a été limitée dans ce pays, à sa plus simple expression. Sauf sur quelques points du centre de certaines agglomérations, elle n'existe pour ainsi dire pas ce pays.

Un autre exemple frappant est donné par la Ville d'Ulm, dans le Wurtemberg. Les terrains considérables que possède cette Cité lui ont permis d'éviter d'une manière complète le renchérissement de son sol. Les habitations y sont peu élevées et entourées immédiatement d'espaces libres très importants; il en est résulté une mortalité générale très faible, voisine, pour le plus grand nombre de quartiers, de 10 pour mille, et une mortalité tuberculeuse très faible.

La situation de cette ville est très brillante comme conséquence.

C'est un exemple frappant de logique et de tenacité donné par cette administration auprès de la Collectivité. Elle a trouvé dans cette méthode, le moyen de faire bénéficier dans la plus large mesure, l'ensemble des citoyens des avantages qui ressortent des propriétaires de terrains.

Si dans l'avenir la hausse certaine des terrains de cette ville se produit, c'est l'ensemble des habitants de la Ville qui en bénéficieront et verront leurs charges d'impôts, actuellement très faible, diminuer encore.

* * * *

Dans les principaux pays du monde civilisé, où les dangers de l'agglomération se font de plus en plus sentir, augmentent dans une proportion grandissante la mortalité tuberculeuse, le grand intérêt est d'éviter pour leurs Cités la spéculation et les hauts prix que peuvent atteindre les terrains destinés à l'habitation.

Les difficultés que rencontrent les prescriptions sur l'Hygiène publique ont presque toujours pour point de départ le terrain et la valeur trop souvent fictive que l'on cherche à lui donner. Pour aboutir à de véritables progrès dans l'extension des espaces libres autour de l'habitation, c'est sur ce point que doit porter tout l'effort. Une Municipalité qui possède beaucoup de terrain, surtout dans les parties d'une ville qui s'étend le plus, peut espérer contrôler en quelque mesure, le marché qui fixe sa valeur.

La spéculation du sol est une des sources directes des charges d'assistance dont le Budget de nos grandes Cités voit le chiffre s'enfler d'année en année.

On commence à s'apercevoir que le terrain des agglomérations urbaines destiné à l'habitation,—nous ne parlons nullement ici de terrains destinés au commerce et à l'industrie,—n'est pas un article d'échange dont le libre marché puisse être laissé ouvert sans de graves perturbations sociales.

Nous sommes parvenus à une période de la vie des Cités où les statistiques révèlent, par leur précision de plus en plus grande, les méfaits causés par l'habitation. Ces méfaits, il faut le proclamer bien haut, trouvent leur origine fondamentale dans les agiotages dont le sol est l'objet. Ils mettent l'Architecte dans l'impossibilité, la plupart du temps, d'élever des maisons de peu d'étages et de les entourer des espaces libres indespensables.

Au point de vue de la Tuberculose, l'encombrement des habitations dans les grandes villes a été reconnu comme le facteur principal de la contagion tuberculeuse.

Les statistiques ont révélées dans différentes parties du monde, les méfaits causés par le surpeuplement, résultat du renchérissement du sol, dont nous venons de parler. Si l'on pouvait établir la proportion exacte qui incombe à ce facteur dans les ruines que la Tuberculose accumule autour d'elle, on serait peut-être étonné du prix exorbitant auquel reviennent à la Société toute entière, ces spéculations que rien n'arrête. La solution de ce problème est de la plus haute importance pour l'avenir sanitaire de nos grandes cités.

Le sol sur lequel se crée l'habitation urbaine populaire sera un jour protégé, car ce n'est que lorsque son prix est peu élevé que l'éclairage et l'aération complets du logement peuvent être obtenus. Aucun remède efficace contre la contagion tuberculeuse par l'habitation ne pourra être appliqué sans résoudre en même temps la question du terrain bon marché.

Avec la connaissance que nous avons de ce grave problème, et ce que nous avons vu dans les principales villes d'Europe, nous estimons que cette réforme dépend des pouvoirs Municipaux. Investis de la haute charge d'améliorer constamment la santé publique, il leur incombe de rechercher en tout premier lieu d'empêcher la hausse fictive du sol urbain. On pourra alors, par des méthodes scientifiques rigoureuses que nous avons développées dans de nombreux travaux, viser à l'orientation des voies publiques, à celle des bâti-

ments, qui ont pour corollaire immédiat d'augmenter l'espace libre au pourtour de la maison d'habitation.

Ce ne sont pas des parcs qu'il faut d'urgence aux habitants, c'est de l'air et de la lumière en abondance dans l'habitation elle-même. C'est le seul remède que reclament ceux qui veulent voir baisser rapidement la terrible morbidité et mortalité tuberculeuse des grands centres.

* * * *

La spéculation du sol des villes est le grand coupable de l'extension des maladies contagieuses et surtout de la Tuberculose.

Un domaine appartenant à la collectivité des citoyens doit être créé afin de lutter énergiquement contre le renchérissement scandaleux du sol dans les villes modernes.

Des modifications profondes doivent être de plus apportées au tracé des plans d'extension des grandes agglomérations modernes, en vue d'appliquer scientifiquement les principes rationnels d'orientation et d'aération à tous les bâtiments affectés à l'habitation.

FIGHTING THE SCOURGE AMONG THE INDIANS.

By Francis E. Leupp,
Commissioner of Indian Affairs, Washington.

Like most uncivilized people, the Indian is very susceptible to the diseases of the white man, especially tuberculosis. He has not behind him generations who have fought the disease; he has, therefore, little immunity from the tubercle bacillus; and the common belief is that the germ was unknown to the Indian until the Caucasian came to this continent and brought it along with other products of civilization.

In his aboriginal life the Indian followed those pursuits which produced and preserved a hardy physique. He was chiefly a hunter and trapper, a warrior, or occasionally a fisherman. His shelter was the least of his wealth. Except in a few rare instances he developed no architectural skill, not even among the tribes of the north, where it seems as if the long, hard winters, would naturally have brought into the scheme of his evolution a storm-resistant type of dwelling. He moved about from place to place, following his game, seeking his enemies, or camping to suit his temporary convenience and pleasure. He thus left his accumulated filth behind him. Of clothing he wore little at any time, and often none.

Times have changed. When the upbuilding of the west made it necessary to curb his restlessness, he was placed on a reservation set apart for his tribe and forbidden for the future to wander at will. The game which he pursued for a livelihood was destroyed or driven away so as to keep him out of temptation, and if there were any remnant left, it was protected by law. His present tendency, fostered by a paternal government, is toward a permanent home. He has learned to build himself a cabin or little house. When the cold season comes, he nails down the few windows, stops the cracks in the walls with old rags, and sets up an American stove, which he heats red. Here, in one or two rooms, for a part of the year at least, he lives with his numerous family, sleeping, eating, and entertaining in narrow quarters, and expectorating everywhere with a frequency which is not exclusively Indian.

He is adopting civilized dress, careless whether he wears all his shirts at one time or in succession. He is rapidly exchanging his hard bed on the floor or the ground for the American iron bedstead with woven wire springs, which soon become soft and yielding to his body. His food—once the fish

of the stream and sea or the wild meat of the plains and mountains, berries, acorns, or a few vegetables that could be quickly and easily raised by a squaw —has also changed. In rare instances the government may provide rations, but the supplemental articles are procured at the trader's, where the Indian too frequently buys poor flour, canned fruit of a low grade, indifferent coffee, and so on.

Perhaps the Indian is an allottee and leases his land, living off the proceeds. This gives him months of idleness; for, his former occupations having gone, he has not yet mastered any to take their place. Besides all these causes for enervation, the bad liquor which the white man taught him to drink, to say nothing of the other vices which follow in the wake of civilization, contributes in large measure to his further physical undoing.

In general, these are the conditions which afford a fruitful soil for the spread of tuberculosis among a people who are exceedingly susceptible to it, to whom cleanliness means nothing, and to whose vocabulary sanitation and hygiene are unknown terms. What the actual prevalence and mortality are, it is difficult to state. The Indian Office has from time to time collected statistics from its agents and physicians in the field, but they cannot be accepted as final. They bear out the testimony of the traveler, the missionary, and the occasional student, that the disease is the greatest single menace to the Indian race.

Recently the Indian Office and the Smithsonian Institution coöperated in making a special inquiry. Dr. Ales Hrdlicka, assistant curator in charge of the division of physical anthropology in the National Museum, undertook the examination of every individual member of one hundred families representative of four or five tribes. He was assisted by a bacteriologist. The results of his investigation are presented to this Congress in charts in the Indian exhibit, and some of his conclusions will appear in a paper before another section of the Congress. Whatever may be the conclusions of the scientists as to the best methods of actively combating the disease, it is the government's duty to concern itself with the more obvious causes of its prevalence, and to take steps to remove these—as far as it is possible to remove them under existing conditions.

With the machinery at its command it can certainly accomplish something, but there are many obstacles in the way. The whole working force of the service must first be educated to an appreciation of the necessity of uniform and determined measures for preventing contagion, or else all the orders from headquarters will fail to accomplish their full intent. Even when the employees have been awakened to the dread character of the scourge, and are versed in the simple rules for checking its progress, the great mass of Indians will remain untouched. Their natural conservatism is already in evidence in all medical matters. Their religions, superstitions, and traditions,

their general suspicion of the white man, are prime elements in the situation. Their communal life, in which every article belonging to any member of a family is treated as belonging to any and every other member of it, will be difficult to change where it means teaching them the necessity for individual clothes, individual eating utensils, individual bathing accessories, and the like.

When it is considered how long it has taken intelligent white people—trained for generations to a massed and congested society—to understand and apply those simple rules which tend to preserve the good health of a community, how much slower must be the process among the Indians, children of nature whom we have dragged away from many of nature's ways!

All measures for the physical soundness of a community may be classed as defensive or aggressive. The merely defensive include all those which are designed to keep the individuals in a state of health automatically resistant to the assaults of disease—proper nutrition, cleanliness, ordinary sanitation, and the exclusion of deleterious elements, whether physical or moral.

How much has the Indian Office done in this regard?

By way of parenthesis, some explanation of the working force of the Indian Service may not be amiss to those who are unfamiliar with it. As far as it is possible to calculate the number of Indians in the United States, their population is about 300,000. For the most part they are segregated on reservations according to tribes. Each tribe is presided over by a bonded agent or superintendent, who, besides his reservation affairs, has the care of one or more schools. His staff includes clerks, teachers, farmers, mechanics, matrons, physicians, disciplinarians, cooks, etc. There are nearly 350 schools directly under the control of the Indian Office, of which, in round numbers, 120 are boarding-schools, either on or off of the reservations. Some of the non-reservation boarding-schools are very large, and have hospitals and trained nurses. There are about 25,000 children in all the schools.

In the boarding-schools the children are sheltered, fed, clothed, and taught. They go to school one-half day and the other half is occupied in manual work. The rations for their table consist of beef or bacon, rolled oats or cracked wheat, beans or rice or barley, coffee or tea or cocoa, dried fruit, flour or cornmeal, syrup, lard, potatoes, onions, vinegar, and spices. Besides, where a garden can be maintained it is expected that fresh vegetables in season will be given the children, and milk, butter, eggs, and fruit when these can be had. Many of the reservations are remote from markets, some are in arid regions where gardening has not been successful, and at other points fresh cows and good beef are not available. The table of rations was prepared with the help of the Department of Agriculture with a view to combining nutritious quality, simplicity, and economy of the food.

The Indian child on coming into school is taught to bathe with regularity, to use his own utensils at the table, to have his own towel in the washroom, his own tooth-brush, and a separate comb. His face and hands must be washed before every meal. He soon finds out that the bed-linen is washed weekly, that his own clothes are changed weekly and washed with regularity.

It has been hoped, by following this constant routine day after day and week after week, to bring about in the child a taste for cleanliness and perhaps the habit of keeping clean. Too often such a habit does not cling when the child returns to his home and family.

Besides the ordinary school equipment, most of the boarding-schools boast a steam laundry and a modern kitchen; and all the schools are built with an endeavor to observe the proper laws of ventilation, drainage, and sewerage. Sanitation is given a distinct place in the course of study prepared by the Superintendent of Indian Schools, as is also the subject of tuberculosis. These topics are discussed at the school service institutes which are annually held.

When pupils develop tuberculosis at the schools, as often happens, the practice has been, by explicit instructions from the office, to send them immediately to their homes. This was judged the wisest step to take, since it reduced the possibility of contagion for the other children, and besides gave the victim himself another chance. Many a child improves on his return home, though the physical environment there is far worse than at the school. The reasons for improvement are probably that the child is released from confinement and is with his own people, for homesickness plays a large part in the emotions of an Indian child.

The office, though maintaining the necessity of giving the Indian child an education, has no intention of making him pay for it by sacrificing his health. Realizing that the children of Indians are little wild creatures, accustomed to free life in the open air, I have gradually studied out a plan for a school-house which will not seem so much of a prison as the conventional building. In certain parts of the southwest where the climatic conditions will permit I am experimenting with a few day-schools built on the general lines of a consumptive's tent-house. A wainscoting as high as a chair-rail fences in the floor, and the space between the wainscoting and the eaves is walled with ordinary wire screen. Outside canvas curtains, mounted on rollers, can be lowered in inclement weather. A high roof throws out eaves hanging well over the walls, and the gable ends of the structure have abundant openings for ventilation. This building is supplemented with an outdoor lunch-room at those schools where a noon-day lunch is served to the pupils.

About a year ago I constituted every reservation and school physician a health officer, with power to enforce sanitary regulations within his jurisdiction. It will be a long time before we shall be able to impress the old

Indian with an understanding of the laws of cleanliness and hygiene, but in many instances we can limit the damage he is able to do his neighbor.

One word in regard to our medical service. If its results seem meager, one must stop a moment to consider its limitations. No country doctor ever had his patients more remote than some of our physicians, whose reservation may extend a hundred miles or more in each direction, with his patients widely scattered over it. Besides, he has that old obstacle and nuisance, the native medicine man, to contend with.

Liquor plays a large part in the increasing physical unfitness of the Indian, as already suggested elsewhere. There has always been a law against the introduction of intoxicating liquors into the Indian country, or its sale or other conveyance to non-citizen Indians anywhere. Like many other good laws, it was for years neglected, being treated as a mere moral declaration rather than a rule of conduct to be enforced by serious sanctions. The general revival throughout the country of a vigorous warfare upon intemperance in drink has had the effect of drawing popular attention sharply to the Indian phase of the subject, with the result that the Congress of the United States has of late been increasing each year the appropriations to enable the Indian Office to continue its efforts. A wide-spread and most effective secret service organization has been established by the office, and neighborhoods which had formerly been notorious for the ease with which an Indian could satisfy there his appetite for alcoholic liquors have been reformed, so that indulgence in such excesses has been cut down among the adjacent Indians at least 60 or 70 per cent.

The larger part of this campaign is, of course, conducted through clever detective work and prosecutions in the courts; but it stands not alone among good causes in the extent to which it depends for its success upon the cultivation of a sound, clear, courageous sentiment among the public of the vicinage. It is a noteworthy fact that the great triumphs in the suppression of the illicit liquor traffic have been won in communities where the people who rank high in business and social matters have come to appreciate their duty in the premises, and have set an example to their less aggressive neighbors in standing stanchly behind the government's agents for the enforcement of the law. And as the whole nation is only an aggregation of local communities, so we must depend upon the spread of such a sentiment all over the United States to keep the lawmakers at Washington encouraged in voting increased appropriations and making such amendments to the statutes as may be necessary from time to time to meet difficulties in the way.

In the great aggressive campaign which is going on all over the world against tuberculosis, what part is the Indian Office taking?

The first step of any importance was the change of the boarding-school on the Colville Reservation to a sanatorium school, the present purpose of which

is to provide a place for incipient cases of tuberculosis in all forms in pupils who are yet able to attend school, but of whom close supervision is needed. It is in charge of a physician as principal. As a sanatorium school it has not been long in operation. Its results, therefore, cannot yet be seen.

In the Indian exhibit you will perhaps observe the sketch of a sanatorium attached to the industrial school at Chemawa, Oregon. A few years ago the superintendent, who is a member of his State Association on Tuberculosis, conceived the idea of conducting his own little open-air relief camp in connection with his school. When any of his pupils seemed to be simply "run down," he sent them to his little camp in the orchard to recuperate. In some cases tuberculosis was pretty evident, in others, only suspected. The success he had with this small endeavor encouraged him to ask for a more pretentious camp. The tent-houses are erected according to the best type, being raised above the ground, with boarded floors and walled to the height of about four feet. The space above the walls, to the eaves of the house, is open to allow free circulation of air. Eight of these small houses around an attractive ellipse will be for the girls. One of the eight cottages will be the recreation room, another a bath-house, and the remaining six will be used as quarters for two girls each. A duplicate scheme will provide for the boys. The buildings are placed in the rear and close to the hospital of the school from whose dining-room the sanatorium occupants will be served. Only incipient cases will be treated in this sanatorium.

This plan, which is subject to local adaptations, will be the model for all the camps to be established in the Indian field. At present preparations are under way for camps at Ft. Lapwai, Idaho, Albuquerque, N. M., Pine Ridge, S. D., Lower Brule, S. D., Mescalero, N. M., Fort Belknap, Mont., and White River, Ariz.

It is not the intention of the office to rush into building camps on every reservation, regardless of the possibility of their success. It is purposed to begin experimentally in a small way in a few places where they seem either most necessary or most feasible, trusting to a considerable extent to those in charge of them to make them not only useful but popular.

It has been anticipated by many of the agents and physicians that it will be very difficult to maintain successful camps for Indians, who object to being isolated; and it is insisted that the patients will so soon weary of the life that they will depart in the night, no one knows whither, and never return; for we must reckon with certain racial peculiarities. Such objections, let us hope, will prove but the lions in the way of all new and undemonstrated ideas. We can at least make the attempt. We *must* make it.

These camps, properly conducted, will be of special value to tubercular pupils returned from school. Here they can be segregated and supervised in a camp on the reservation without being cut off entirely from their friends.

There is another and most important, though little known, office held by women, which might easily become the greatest power for good in the service. Sometimes near the agencies, but oftener in out-of-the-way places, the government has established field matrons. Each is given a cottage by the government and certain accessories needed for her work. She is supposed to visit the sick; look after the aged, whom too often the young and well Indians neglect; teach mothers how to care for their children properly, and show housewives how to keep their homes clean and their families clothed and fed. Here is the point of our closest contact with the old-fashioned Indians, whose mental and physical horizon has always been, and doubtless will be till death, limited by the reservation. It is now proposed to put into the hands of the field matrons—many of whom, though cleanly, are not familiar with the subject of tuberculosis in more than a vague way—a small pamphlet containing only those simple facts and rules which will inform them how to care for the cases that may come under their notice, and for preventing contagion. It will not be possible to send into the wilderness such rules as govern the care of cases in Washington or New York. Milk and eggs may be unknown quantities, and other highly nutritious and easily digested foods out of the question. Disinfectants, too, may be hard to get. Water, even, may be had by the bucketful only. But fresh air for the patient, rest, a certain degree of cleanliness, and the absolute destruction of the sputum of all tubercular cases—these essentials can be not only preached but practised everywhere. Indeed, if we can do no more with the old-fashioned Indian than instil into him a wholesome fear of the sputum, we shall have accomplished a good deal, and reduced contagion at least by the fraction of a degree.

A large number of Indians in the Dakotas, all included in the great Sioux family, speak substantially the same tongue, which they can also read. It has been suggested to the office that a few axioms regarding tuberculosis, or perhaps a popular treatise on it, might be translated into their language, as an effective means of reaching the reservation Sioux. This suggestion the office purposes to follow in the near future.

The Indian school at Carlisle, Pennsylvania, the largest in the service, has undertaken a course of popular talks on the subject of tuberculosis, to be given by the physician. Extracts from these talks will be printed by the school press for distribution in the service.

Some immediate and very practical results will follow the investigation of Dr. Hrdlicka in the field. At one or two schools the band instruments were examined by the bacteriologist of the expedition, Dr. Paul Johnson, and found to contain bacilli. As there are many bands in the schools, and all of them popular with the students, the Indian Office, under advice from the Hygienic Laboratory, has ordered that all wind instruments be disinfected,

and that no pupil known to be tubercular shall be allowed to use them at any time.

The matter of recreation in the schools we are inquiring into, with a view of relieving the Indian child of too much confinement and routine. For it is undoubtedly a physical strain on an Indian child to be taken from his free life on the reservation, where there is no count of time save by the rising and the setting of the sun, and placed in a populous school, where everything goes by the clock, the bell, or the bugle.

The writer of this paper is painfully aware of its shortcomings in many respects. The only purpose for which it was prepared was to prove the live interest taken by the custodians of the American Indians in such work as that represented by the distinguished gathering to whom it is most modestly presented. It makes no pretence of adding anything to the store of knowledge possessed by the scientific world; it is intended to draw out suggestions rather than to record accomplishments; and the most that can be hoped for it, in behalf of the Indian Office, is that its readers may discern—

between the written lines
The finer grace of unfulfilled designs.

La Lucha Contra la Plaga Entre los Indios.—(LEUPP.)

Como otros pueblos primitivos, los Indios Americanos son muy susceptibles à la tuberculosis. Diferentemente de los Caucasianos, ellos no tienen predecesores que hayan estado resistiendo la enfermedad hasta el punto de una comparativa inmunidad; y el tuberculo fueron desconocidos de los Indios, se cree, hasta que los blancos llegaron á este hemisferio.

En su vida aborígena, los Indios no tienen casa permanente, y sus ocupaciones eran tales á mentenerlo afuerza y endureciendo su cuerpo. Cuando su tepee (su tienda ce pieles) estaba rodeado de inmundicias, se mudado á otro lugar fresco. Llevaba pocos vestidos, en algunos lugares ninguno. La exposición abierta al sol, una pesada dieta de carne y una esparcida y samoviente población eran una segura defensa contra los gérmenes.

Los tiempos han cambiado. El Indio no puede vagar por donde quiera à voluntad. Sobrecarga su cuerpo con modernos vestidos. Se le ha enseñado á vivir en una choza en la que clava las pocas ventanas, tapa las endijas y prende una estufa que calienta al rojo. En uno ó dos cuartos de estos edificias come, duerme, levanta su familia, entretiene su gran círculo de amigos, expectora, se enferma y muere. Todas las condiciones son perfectas para la propagación de la tuberculosis. A su debido tiempo esta comunidad se convierte en un nido de infección para la gran comunidad de blancos que rápida crece á su alrededor. Educarlo en el arte de

vivir en las condiciones de civilización es la primera necesidad con que se tropieza en este caso. La limpiesa del cuerpo, de la casa y sus habitos, que tan largo tiempo se ampleado en ensenar la hombre blanco ignorante, tomarà todavía más largo tiempo para enseñar el Indio; y la naturaleza de su mente es tal que tendremos no solo que forza las reglas sobre él en su propio bien, sino tambien un paciente trabajo para hacerle comprender las razones y su necesidad.

La Oficina de Indios, completamente prevenida de la prevalencia de la enfermedad, está no solo á la defensiva sino que hace higiene y sanidad, con especial referencia á la tuberculosis, una hace de sus Regulaciones, su Curso de estudio para sus escuelas, su colècción de estadística, sus circulares para el servicio del campo y sus Institutos de Maestros. Al prepararse para tomar parte en el Congreso Internacional de Tuberculosis, ha enviado, en cooperación con el Instituto Smithsonian, al Dr. Ales Hardilicka, al campo, quien con bacteriologista ha hecho una investigación por lo menos en cinco tribus. Sus conclusionnes secán presentadas á otra sección del Congreso.

La Oficina trabaja en un definitivo programa para posteriores trabajos. Una de las escuelas en el estado de Washington ha sido convertida en Sanatorio para aquellos niños tuberculosos hábiles para ir á la escuela sean educados y se ten ga cuidado de ellos. Una gran escuela en Oregon ha mantenido por algunas años con éxito un campamento en donde los pupilos infectados pueden vivir vida á completo aire libre; este campamento, agrandado hoy sobre planes modernos será el modelo para otros campamentos que se establecerán pronto en Idaho, Montana y donde quiera en el país de los Indios. La escuela Carlisle, en Pennsylvania tiene un curso preparado que se seguirá en las conferencias ante los est diantes é imprimirá circulares para distribuirse durants el Servicio. Cada médico de Reserva ha sido investido con la autoridad de oficial de Salud é Inspector de Sanidad, y las matronas del campo seràn instruidas especialmente para trabajo de casa en casa entre los Indios de quienes ellas son ministros. Tambien se proyecta la traducción de algunas reglas simples preventivas en el lengua Dakota, el Ojibway y otras lenguas nativas.

THE UNITED STATES MARINE-HOSPITAL SANATORIUM FOR TUBERCULOSIS AT FORT STANTON, NEW MEXICO.

By P. M. Carrington,

Surgeon United States Public Health and Marine Hospital Service.

Introductory and Historical.

The Fort Stanton Sanatorium, being one of the three sanatoriums maintained by the national government for the treatment of tuberculosis, it has been thought advisable that I present to this Congress a brief account of the work of the sanatorium from its inception in 1899 to the present year.

In former articles* I have presented to the profession accounts of the work at Fort Stanton. This article includes consolidated statistics from the opening of the sanatorium in November, 1899, to June 30, 1908—a period of nearly nine years. During this period we have treated 1397 individuals and, including readmissions, 1499 cases.

Fort Stanton was established as an army post for the control of the Mescalero-Apache Indians in 1855. The post was burned and abandoned in 1861 by the United States forces upon the approach of the Texas troops under General Sibley. In the spring of 1863, after the defeat and withdrawal of the Confederate troops, it was reoccupied, and from 1868 to 1871 rebuilt. Necessity for its existence as an army post having ceased, it was abandoned in August, 1896, and a long-cherished project of Surgeon-General Wyman was consummated when, on April 1, 1899, President McKinley signed an executive order transferring the Fort Stanton Military Reservation to the Treasury Department for use by the then Marine Hospital Service, as a sanatorium for Consumptives.

The reservation with its thirty odd buildings was received by Passed Assistant Surgeon (now Surgeon) J. O. Cobb, representing the Marine Hospital Service, shortly after the date of the executive order, and the work of pre-

* "Sanatorium Treatment of Tuberculosis," published in The Journal of the American Medical Association, December 6, 1902. "Further Observations on the Treatment of Tuberculosis," published in Journal of the Association of Military Surgeons, 1904.

paring the buildings for occupancy was immediately begun, the sanatorium being actually opened by the reception of the first patient in November, 1899.

Descriptive.

(*a*) *Geographical.*—The Fort Stanton Sanatorium is located in Lincoln County, in south central New Mexico, in 33.5° north latitude and 105.5° longitude west of Greenwich. Its area is nearly 45 square miles, in the center of which, on the south bank of the Rio Bonito, are situated the sanatorium buildings. This large area was necessary and has been fenced for a horse and cattle range, and also to prevent the too near-by settlement of undesirable neighbors.

(*b*) *Topographical.*—The reservation is situated in the foothills of the White Mountains, with the Rio Bonito traversing it from west to east for a distance of eight miles. Its surface includes the beautiful valley of the Rio Bonito, hills of varying altitude, and broad mesas or table-lands. These hills, brown and bare during the greater portion of the year, are, during the late spring and early summer months, clothed in verdure and a kaleidoscopic array of wild flowers. Along the Bonito the cotton-wood trees, black walnuts, and a species of the live oak grow in profusion, while many of the hills are covered with piñon, juniper, and cedar, which supply us with fuel.

The sanatorium buildings are surrounded on the north and south by hills rising from 300 to 600 feet above them, and affording protection from severe winds. To the east are the foothills of the Capitan Mountains, which at a distance of 10 miles rise to an altitude of 10,000 feet. To the westward the hills rise tier upon tier and culminate, 20 miles away, in White Mountain Peak, 12,000 feet above sea-level, snow-capped during the greater portion of the year, and the source of the Rio Bonito.

The Rio Bonito well deserves its name, for it is a beautiful stream; traversing a lovely and fertile valley, its water irrigates productive fields and orchards. Here the apple, peach, and pear grow in all their perfection and beauty, and many small fruits, farm and garden products are produced in great abundance.

(*c*) *Climatological.*—The climate of Fort Stanton is in general terms that of the arid southwest, but modified by differences in altitude, latitude, and topography. Its climate is characterized by small rainfall, low relative humidity, large percentage of sunshine, and comparative freedom from high winds, with cool or cold nights according to the season. The topography is such that natural drainage is excellent. The soil is porous and dry and evaporation very rapid. While there is a wide daily range of temperature, the low temperatures occur during the night, and even on the coldest days outdoor life is not only possible, but pleasant, on account of the warm sunshine.

We claim for the climate of Fort Stanton that it permits agreeable outdoor life almost every day in the year, and for a greater number of hours in the day than is possible in the east. Patients more readily obey regulations requiring them to be out-of-doors when to do so is convenient and pleasant.

The altitude of about 6200 feet stimulates respiration, bringing into functional activity portions of the lungs which at lower altitudes are inactive. The high hills surrounding the sanatorium buildings give protection from high winds, and dust-storms, so prevalent on the plains and table-lands of the southwest, are of comparatively infrequent occurrence. We have an abundant supply of pure snow water from the Rio Bonito during a greater portion of the year, and when the stream fails, a deep well furnishes an ample supply of soft and remarkably pure water.

Character of Cases Admitted.

We admit to the Fort Stanton Sanatorium cases of tuberculosis of the lungs in all stages, as well as tuberculosis of other organs. As will be noted from the statistical tables, there is a great preponderance of moderately and far-advanced cases. Eliminating readmissions, we have treated during the period covered by this report 1339 cases of tuberculosis, divided as follows:

Incipient	80
Moderately advanced	492
Far advanced	765
Tuberculosis of other organs	2
	1339

This summary does not include consumptive officers and employees, who are treated of under a separate heading. In these 1339 cases nearly half were above thirty-five years of age, and a very large percentage suffered from grave complications of stomach, liver, kidneys, and other organs.

Housing.

When Fort Stanton was transferred to the Treasury Department for use as a sanatorium, the old army buildings, consisting of officers' quarters, barracks, offices, and various service and outbuildings, to the number of more than thirty, were found to be in a condition of deplorable dilapidation, but the walls at least were all good, and the existence of these buildings was a factor of weight in determining the selection of this particular location. Nearly all the old buildings have been altered and repaired to fit them for their new uses. Two old barracks buildings were fitted up as dormitories, and when in 1905 the old army hospital was destroyed by fire, one of these dormitories was hastily prepared for use as a temporary hospital; lacking appropriation for a new hospital, it continues to be used for this

purpose. These dormitories accommodate about sixty patients each, and good ventilation is had by means of opposite windows and doors, and also by means of roof ventilators. They are supplied with ample toilet and bath facilities, but we find in experience that most of our patients prefer to live in tents or tent-houses; chiefly, we believe, because of the greater privacy obtaining in the latter.

Early in my detail at Fort Stanton I began the use of tents. We at first pitched an ordinary 12 by 14 tent, placed in it two beds, and laid a few boards on the ground between the two beds. Even this crude tent became popular, and we gradually improved upon it.

For these tents, as well as tent-houses and dormitories, a certain standard of opening for ventilation has been adopted, and the officer of the day, in making his inspections, sees to it that this standard is maintained. Our tent-house we regard as a very nearly perfect consumptive dwelling. It is now built 14 feet square, with a front porch and a clothes-closet in the rear. The openings are very ample, being formed by canvas panels, the doors made of two panels of the pattern known as the "Dutch door," while the window panels are hung on weights, and readily slide up and down; they may be opened from the outside as well as from the inside. Each tent-house is supplied with a small sheet-iron stove, and a patient may close all the openings, undress, and retire in a warm room; then the nurse may come around and open up the tent-house freely for ventilation. Each tent-house, and tent as well, is supplied with an electric light, and each group of a dozen tents, or tent-houses, has in its center a toilet and bath-house, which serve the patients occupying that group.

Prevention of Infection.

Our efforts to prevent the infection of the sanatorium have met with apparently perfect results. The principal precaution, of course, relates to the disposal of sputum. We use at Fort Stanton a metal pocket-cup and a bedside cup consisting of a light metal frame and a paper filler. The pocket cups are disinfected daily by steam under pressure of two atmospheres, and the paper fillers are burned in crematories especially constructed for this purpose.

Urine of all patients in the hospital, as well as of other cases in which there are indications therefor, is received in vessels containing a solution of carbolic acid or formalin, and, of course, stools of patients with tubercular enteritis are disinfected before being disposed of. In view of the fact that recent observers have demonstrated the presence of the bacillus in the dejecta of a very large percentage of all consumptives, it may seem superfluous to disinfect these stools. All our sewage is disposed of by the irrigation method in a fenced area considerably larger than absolutely necessary, but we feel that it is wise to limit, so far as possible, the number of bacteria whose

destruction we must depend upon by this method. Stringent regulations regarding spitting elsewhere than in the cups provided are enforced. There have been occasional infractions of the spitting ordinance, but we find that patients become so accustomed to the use of spit-cups that the action is mechanical and automatic, and that spitting elsewhere than in the cups is a rare exception. The detection of any one spitting elsewhere than in his cup is always followed by summary dismissal, and in the rare instances where it has been necessary, has had a most salutary effect.

Daily Routine.

With a daily average of from 200 to 225 patients we have found it convenient to divide the work into various departments rather than to assign a particular number of patients to each medical officer. The commanding officer devotes himself chiefly to administrative details. One officer has charge of physical examinations and another has the laboratory work. The hospital is in charge of another officer, and one has the ambulant sick call, while another has the surgery and still another the nose and throat clinic. Each junior medical officer serves in turn as "officer of the day" for a period of twenty-four hours, and while so serving it is his duty to make a morning inspection of all quarters occupied by consumptives, baths, toilets, etc. He answers emergency calls, receives arriving patients, and between the hours of 9 P. M. and midnight makes a second general inspection, chiefly with a view to ascertaining whether or not good order and discipline prevail. Upon going off duty at 9 A. M. he renders a written report, on a blank form designed for the purpose, of the occurrences of the twenty-four hours. Any adverse report is referred by the commanding officer to the person whose duty it is to correct it. Out of seven medical officers, two, including myself, are recovered consumptives, and three are under treatment and fast recovering.

Patients upon arrival are first assigned to the receiving ward, and remain at rest in bed for at least four days, in the mean time being taught by oral instructions and frequent perusals of a leaflet what manner of life they are expected to live in the sanatorium. On the fifth day they are, if able, brought to the examining room, and a record of pulse, temperature, etc., furnished the examining officer. These cases are then transferred to one of the dormitories, tents, or tent-houses, as their condition may justify. Cases unable to leave the receiving ward are examined in bed, and transferred to the hospital ward proper, where they remain in bed for as long as may be necessary.

Once in each week the officer in charge of the ambulant sick call, composed of more than two-thirds of the patients, gives a lecture at his regular morning

call, upon the subject of sputum disposal, ordinary hygiene, and other matters affecting the daily life of the patients under his charge. He follows up these lectures by daily visits to the dwellings of his patients, exercising a minute supervision over their manner of life.

Rest and Exercise.

Not the least of our remedial agents is rest. Where there exists a doubt, the consumptive should rest rather than exercise. Even the best cases should take their exercise with proper caution, and this is especially true of newly arrived cases, who have not as yet become readjusted to the change in altitude from sea-level to over 6000 feet. Patients showing febrile reaction and those with a pulse-rate of 100 or more we keep at absolute rest. Those with very limited chest expansion, but in other respects capable of taking a certain amount of exercise, are put through simple breathing exercises daily with a view to increasing their chest expansion. The officer in charge of the ambulant sick call exercises great care and personal supervision over his men, attempting to control their daily habits, particularly with reference to the amount of exercise permitted, individualizing as far as possible and prescribing rest and exercise in appropriate proportions according to the requirements of each individual case.

We find many consumptives either desiring or actually coming to the neighboring towns and ranches with a view to earning their living in a rather rough way. This we discourage so far as lies in our power, believing that the influence of appropriate climate in the treatment of tuberculosis suffers in the estimation in which it is held by our eastern brethren because of failures which result from the class of cases referred to, who come to the southwest without means, and actually kill themselves as a result of their efforts to be self-sustaining.

Amusements.

To keep our patients entertained, amused, and satisfied has been a problem which we have not always solved satisfactorily. However much we may disagree as to the admissibility of various forms of amusement, we certainly are all agreed as to the necessity of entertaining and interesting our patients. I find it frequently necessary to permit amusements which are not entirely unobjectionable rather than, by their interdiction, to permit patients to brood and mope. We therefore permit croquet, cards, walking and shooting, golf, and, in a small percentage of extra good cases, horseback exercise. The stooping required in playing croquet, the excitement inevitable in card-playing, and other objectionable features of most forms of amusement I consider less evil than absolute inaction. Of course, certain cases are forbidden any form of exercise or amusement and many require absolute rest.

We make an effort to individualize, and the officer in charge of the ambulant sick call spends a large portion of his time in visiting his patients in their quarters and advising them with regard to their exercise and amusements. When in any doubt as to the admissibility of amusements, they are denied.

Statistics and Comments Thereon.

Gross total of admissions (exclusive of officers and employees)	1441
From this amount should be deducted the readmissions, amounting to	102
Which leaves the number of individual cases treated	1339

The class of cases composing this 1339 is as follows:

Tuberculosis of lungs	1337
Tuberculosis of testicle	1
Tubercular abscess, psoas	1
Total	1339

The results obtained in the above-mentioned 1337 cases of tuberculosis of the lungs were as follows:

INCIPIENTS.

Cured	0	
Apparently cured	25	
Arrested	19	
Improved	19	
Unimproved	14	
Died	1	
Under treatment for less than thirty days (still on hand)	2	80

MODERATELY ADVANCED.

Cured	2	
Apparently cured	63	
Arrested	81	
Improved	233	
Unimproved	34	
Died	73	
Under treatment for less than thirty days (still on hand)	6	492

FAR ADVANCED.

Cured	2	
Apparently cured	14	
Arrested	76	
Improved	209	
Unimproved	79	
Died	374	
Under treatment for less than thirty days (still on hand)	11	765
Total		1337

SUMMARY.

Cured	4	
Apparently cured	102	
Arrested	176	
Improved	461	
Unimproved	127	
Died	448	
Under treatment for less than thirty days (still on hand)	19	
Total		1337

During the period covered by this report we have also treated, in addition to the 1337 cases of tuberculosis of the lungs above recorded, 58 consumptive officers and employees. In these cases the results have been as follows:

INCIPIENTS.

Cured	0	
Apparently cured	7	
Arrested	3	
Improved	5	
Unimproved	1	
Died	0	
Under treatment for less than thirty days (still on hand)	1	17

MODERATELY ADVANCED.

Cured	1	
Apparently cured	4	
Arrested	4	
Improved	5	
Unimproved	1	
Died	0	
Under treatment for less than thirty days (still on hand)	0	15

FAR ADVANCED.

Cured	0	
Apparently cured	3	
Arrested	4	
Improved	10	
Unimproved	7	
Died	2	
Under treatment for less than thirty days (still on hand)	0	26
Total		58

SUMMARY.

Cured	1	
Apparently cured	14	
Arrested	11	
Improved	20	
Unimproved	9	
Died	2	
Under treatment for less than thirty days (still on hand)	1	
Total		58

In the foregoing statistics I have treated all the cases received at the sanatorium from its opening in November, 1899, to and including June 30, 1908, as though the sanatorium had closed on the last day of June. Of course, as an exhibition of our results the figures as given above are somewhat misleading; therefore, in order to entirely clarify the matter, the following tables are added:

As heretofore shown, the individual cases treated were as follows:

Tuberculosis of the lungs		1337
Tuberculosis of testicle		1
Tubercular abscess, psoas		1
		1339
Cases treated for thirty days or less:		
Discharged	115	
Still under treatment	19	134
Cases discharged, treatment being terminated:		
Tuberculosis of lungs		1033
Tuberculosis of testicle		1
Tubercular abscess, psoas		1
Cases still under treatment		170
Total		1339

The following results were obtained in the 1033 discharged cases in which treatment was terminated, viz.:

INCIPIENTS.

Cured	0	
Apparently cured	25	
Arrested	15	
Improved	15	
Unimproved	10	
Died	1	66

MODERATELY ADVANCED.

Cured	2	
Apparently cured	63	
Arrested	51	
Improved	198	
Unimproved	24	
Died	73	411

FAR ADVANCED.

Cured	2	
Apparently cured	14	
Arrested	40	
Improved	151	
Unimproved	53	
Died	296	556
Total		1033

SUMMARY.

Cured	4	
Apparently cured	102	
Arrested	106	
Improved	364	
Unimproved	87	
Died	370	
Total		1033

Miscellaneous statistics of the 1337 cases treated for tuberculosis of the lungs:

AGES OF PATIENTS TREATED.

Under 25 years	243
Between 25 and 34 years	479
Between 35 and 44 years	384
Between 45 and 54 years	176
Over 54 years	55
Total	1337

HEREDITY IN PATIENTS TREATED.

History of tuberculosis in parents	199
No history of tuberculosis in parents	1109
History of tuberculosis in parents doubtful	23
History of tuberculosis in parents no record	6
Total	1337

TUBERCLE BACILLI.

Were not found in sputum of	65
Were found in sputum of	1250
No record	22
Total	1337

RECORD OF PULMONARY HEMORRHAGES OF PATIENTS TREATED.

Before arrival only	241
After arrival only	85
Both before and after arrival	190
Neither before nor after	613
Streaked sputum	208
Total	1337

LENGTH OF TIME UNDER TREATMENT AT SANATORIUM.

Over 2 years	159
Between 1 and 2 years	247
Between 6 and 12 months	311
Between 3 and 6 months	274
Between 3 and 1 month	212
One month or less	134
Total	1337

It will be noted, and attention is particularly invited to the fact, that out of the 1339 individual cases treated, only 80, or about 6 per cent., were incipient, and that more than 50 per cent. were far-advanced cases. If we

eliminate from this total the cases still under treatment, and cases in which treatment was terminated within thirty days, there remains a balance of 1033 cases in which the results are shown in one of the foregoing tables, from which it will appear that 576, or considerably more than 50 per cent., were cured, apparently cured, arrested, or improved. The deaths amounted to about 35 per cent. and the unimproved to less than 10 per cent.

Turning next to the tables covering 58 cases of consumption among officers and employees, it will be noted that the percentage of cures, apparent cures, and arrests is very much larger. This I attribute largely to the fact that the patients included in this list are of a generally higher grade of intelligence, education, and refinement than the average of the class included in the larger list, and it argues that the intelligent and educated consumptive, being more readily convinced of the necessity and importance of the regulations made for his daily guidance, more willingly gives heed to such instructions, and therefore has a better chance of recovery than his more ignorant and less tractable fellow-sufferer.

Industrial Features.

In establishing the sanatorium at Fort Stanton, it was the desire and intention of the Surgeon-General that the sanatorium should eventually become in some measure self-supporting. With this object in view we secured a reservation of nearly 45 square miles, fenced it, and stocked it with beef and dairy cattle, as well as with horses for breeding purposes. We have always produced our entire milk-supply, and are just now producing all the beef we can consume. We maintain a truck garden of about 10 acres, producing all of our fresh and a large part of our winter vegetables, and have planted an orchard which will shortly supply us with all of our fresh fruit. These various industries provide us the means of furnishing employment to many of our recovered cases who desire to continue their residence in the region where they have recovered. Similarly we are enabled to give employment to and actually give preference to consumptives seeking employment, provided their condition will permit them to work at these various employments. In addition to the features mentioned above, we maintain a farm of about 200, acres producing our own hay and a portion of our grain.

In our plumbing, painting, and carpentry departments we frequently find it possible to employ consumptive workmen.

A considerable number, although I am unable to give exact figures, of our apparently cured, arrested, and improved patients have taken up employment in near-by localities. Most of those who were apparently cured or arrested upon dismissal have progressed to recovery. Some of them continue to reside in this region because of having become attached to the locality and its climate. To mention a few instances: a former chaplain,

discharged from treatment about eighteen months ago, apparently cured, is pastor of the Presbyterian Church at Tucumcari and writes me that his health continues robust. Another was at last accounts conducting a meat market and restaurant in the growing town of Carrizozo, New Mexico; another conducts a small general store which gives him a clear net profit of $75 to $100 per month; another, a newspaper man, who during the two years of his employment here had the duty of daily inspecting and keeping in repair our principal water-supply ditch, was discharged apparently cured and took a position on a Beaumont, Texas, paper, later going to San Antonio, and is at present in apparent good health, acting as city editor for a daily newspaper in St. Joseph, Mo.; and such cases might be multiplied indefinitely.

Mortality and Explanation Thereof.

We receive cases, as heretofore stated, in every possible stage of the disease, and their ages have varied from eighteen to eighty-four years, although a majority are under forty years of age. I will not attempt to give a detailed list of tubercular and non-tubercular complications. The following are some of the most frequent complications noted as affecting prognosis:

Fistula in ano	26
Intestinal involvement	40
Laryngitis	148
Chronic nephritis	108
Asthma	14
Aneurism of aorta	5
Diabetes mellitus	5
Involvement of lymphatic glands	26
Hemorrhoids	97
Otitis media	54
Arteriosclerosis	15
Valvular disease of the heart	115
Degeneration of columns of cord	4
Hemiplegia and other paralyses	5
Pneumothorax and hydrothorax	28

A very large percentage of our cases have been addicted, prior to their reception by us, to the excessive use of alcoholic liquors, and nearly all of the complications referred to above have been in existence at the first examination. The chronic alcoholic is not only apt to have serious degeneration of the liver, but such patients almost invariably have stomachs the functions of which are very seriously impaired and thus militate against recovery. Out of a total of 448 deaths, 78 cases have succumbed to the disease within thirty days after arrival. Given an advanced stage of tuberculosis of the lungs in a chronic alcoholic subject, the possibility of recovery or even improvement is reduced to a minimum. From 60 to 75 per cent. of our patients suffer from advanced pyorrhœa alveolaris.

Treatment and Concluding Remarks.

The only treatment upon which we rely with any feeling of security is living in the open air as much of the time as possible; second, a dietary as complete and satisfying as is possible; and third, but not least, rest and graduated exercise, with that general supervision of the patient's daily life and conduct which comprises hygienic treatment.

We maintain our own dairy herd, producing from 80 to 150 gallons of milk per diem according to the season, and our patients are only restricted in the use of milk by the quantity produced. During the seasons of greater plenty we produce often as much as 500 to 600 pounds of butter monthly, and we have from our own chicken yard during a considerable portion of the year sufficient newly laid eggs to supply those patients who are eating them raw. We have found no medical treatment which offers any noticeable betterment of our results. We have recently attempted the use of mercury succinimid by deep muscular injection. We have used this treatment on twenty-five or thirty patients during a period of two months, but have been unable to secure any results even remotely approaching those published by Surgeon Wright, of the navy. For hemorrhage we use amyl nitrite, the recumbent posture, and ice-bags, followed by the use of sodium nitrite. Personally, I have very little faith in medicinal treatment for hemorrhage. We have recently been using tuberculin for diagnostic purposes, using the ophthalmic test. This has been valuable in diagnosis of obscure cases. We have recently begun the use of tuberculin by mouth, after the method of Arthur Latham, of London. Our cases are as yet few and have been continued for too short a time to warrant any positive opinion as to its value, but it has seemed to be of value in the carefully selected cases in which we have used it.

I am more and more convinced of the necessity of individualizing in the treatment of tuberculosis; that is, that each patient shall be carefully studied by the officer in whose care he immediately is, and then his daily life, particularly as to food, rest, exercise, and the like, carefully outlined to meet his individual needs, and this we attempt to do as nearly as it may be possible.

There is another matter affecting very seriously our statistics which I will ask you to remember in considering this paper, namely, that although our patients are sent from the various hospitals of the service, absolutely without expense to themselves, we have no control over the length of time they may be willing to remain under treatment. It consequently happens in an always large percentage of cases that many such, instead of being recorded as "improved" or "arrested," would with just a little more patience have been recorded "apparently cured."

ADDENDA.

METEOROLOGICAL DATA FOR FORT STANTON, NEW MEXICO.

Average number of Days.

Clear	16	14	13	15	16	13	10	11	13	20	16	16	173
Partly cloudy	11	10	13	12	12	13	15	15	11	7	9	12	140
Cloudy	4	4	5	3	3	4	6	5	6	4	5	3	52
With precipitation	4	5	5	3	4	7	11	11	8	4	4	4	70

Average Monthly Relative Humidity. (For 28 Years.)

0.64	0.72	0.86	0.64	0.89	1.76	3.16	3.44	2.30	1.45	0.67	0.88	17.41

Average Monthly Relative Humidity. (For 7 Years.)

60	55	47	37	34	41	55	57	59	56	59	61	52%

Mean Maximum Temperature. (For 7 Years.)

47	52	56	65	72	81	83	80	74	66	55	49	65

Mean Minimum Temperature. (For 7 Years.)

21	27	29	36	44	50	56	54	48	37	28	24	38

Mean Temperature. (For 28 Years.)

35	38	44	51	60	67	69	67	61	52	42	36	52

Highest Monthly Temperature.

69	76	73	78	85	94	95	92	86	80	72	68 (July)	95

Lowest Monthly Temperature.

—6	—3	6	14	29	34	46	44	31	22	7	—18	—18	Dec. 22, 1887

Average Hourly Wind Velocity.

8.0	9.2	8.4	8.2	7.5	6.0	4.5	4.7	4.4	5.2	6.1	6.8	6.6

Highest Velocity.

51	54	60	60	63	42	44	36	30	42	44	50	63, May.

Monthly Average Snowfall.

1.6	2.1	8.2	T.	0	0	0	0	0	T	4.2	6.2	22.3

Average date of last killing frost in spring.....May 6th
Average date of first killing frost in autumn.....October 5th

---

U. S. M. H. S. Sanatorio para Tuberculosos en Fuerte Stanton, N. Mex. Resultado de Neuve Años de Trabajo.—(CARRINGTON.)

Este artículo incluye estadística desde Noviembre de 1899 à Junio 30 de 1908. Aproximadamente 1,400 individuos fueron tratados. Fuerte Stanton fué originariamente un puesto del Ejército para contener los Indios Apaches. Fué dedicado á Sanatorio por orden Ejecutiva del Presidente McKinley, April 1 de 1899.

Descripción.—(*a*) Geografía: Está colocado en el Condado Lincoln en

el sur central de Nueva México. El area de la Reserva, bajo cerca, es aproximadamente de 45 millas cuadradas; larga area necesaria para la colocación de ganado y caballos.

(*b*) Topografía: La Reserva, situada al pié de las colinas de Montaña Blanca, atravesada de este à oeste por el rio Bonité una distancia de ocho millas, comprende valles, colinas y mesetas.

(*c*) El clima está caracterizado por poca caída de lluvia, poca humedad, excelente desecación, suelo seco, alto percentaje de sol claro y comparativamente libre de altos vientos, con frescas ó frias noches.

Caracteres de los casos admitidos.—Casos recibidos en todos los estados. Gran preponderancia de casos avanzados. Gran percentaje de complicaciones graves.

Acomodo.—Se usan grandes dormitorios, tiendas y casatiendas. Descripción de las últimas nombrades.

Para Prevenir la infection.—Se dispone de los esputos, principalmente por incineración.

Rutina diaria.—Descripción de la rutina diaria para mantener el Sanatorio.

Dieta.—Amplia y variada, con preponderancia de carne fresca, leche y huevos. No se fuerza la alimentación.

Ejercicio y descanso.—Diversiones y entretenimiento necesario.

Estadística y comentario sobre ella.—Estadística que cubre como 1,400 individuos y 1,500 casos más ó menos, con comentarios.

Mortalidad y su explicación.—Gran mortalidad inevitable debido al gran percentage de casos muy avanzados; serias complicaciones frecuentes; gran percentage con malos hábitos adquiridos y pobreza de inteligencia y educación.

Aspecto industrial.—Ventaja del Sanatorio en su capacidad para suministrar empleo á los casos convalescientes.

Tratamiento y Observaciones Finales.—El clima, la dieta y el tratamiento higiénico es en lo que casi solamente se confía.

U. S. M. H. S. Sanatorium pour tuberculeux à Fort Stanton, New Mexico.—(CARRINGTON.)

Préliminaire et historique.—Cet article renferme des statistiques depuis novembre 1899 jusqu'au 30 juin 1908; environ 1,400 individus de traités. Fort Stanton originellement un Poste de l'Armée pour surveiller les Indiens Apache, réservé comme sanatorium par Ordre Exécutif du Président McKinley, le premier avril, 1899.

Description.—(*a*) Géographie: Situé dans Lincoln County à la partie sud centrale de l'État de New Mexico. Aire de Réservation environ 45

milles carrées; enclos; cette grande étendue nécessaire pour bétail et chevaux.

(*b*) *Topographie:* Réservation située au pied des Montagnes Blanches, traversée par Rio Bonito de l'ouest à l'est une distance de huit milles; contenant des vallées, des collines et des plateaux.

(*c*) *Climatologie:* Climat caractérisé par peu de pluie humidité basse, écoulement excellent, sol sec, grande proportion de lumière de soleil, abri contre les vents violents, nuits fraîches ou froides.

Caractère des cas admis.—Cas reçus dans toutes les périodes. Grande prépondérance des cas médiocrement avancés et des cas graves. Grande proportion de complications graves.

Logis.—Grands dortoirs, tentes et maisons-tentes. Description de celles-ci.

Prévention d'infection.—Disposition des crachats, principalement par incinération.

Routine journalière.—Description de la routine journalière et de la direction du sanatorium.

Nourriture.—Abondant et varié avec prépondérance de bœuf frais, lait et œufs. Pas de gavage.

Repos et exercise.—Importance de repos et soin nécessaire à l'égard d'exercise.

Amusements.—Divertissement et amusement nécessaires.

Statistiques et commentaires.—Statistiques d'environ 1,400 individus et environ 1,500 cas, avec commentaires.

Mortalité et son explication.—Grande mortalité inévitable à cause de la grande proportion de cas très-avancés, souvent complications sérieuses, grande proportion de cas aux mauvaises habitudes préalables, et bas dégré d'intelligence et d'éducation.

Advantages industriels.—Avantages du sanatorium d'occupation pour les convalescents.

Traitement et dernières observations.—Le traitement est uniquement climato-thérapeutique, diététique et hygiénique.

U. S. M. H. S. Sanatorium für Tuberkulose in Fort Stanton, Neu-Mexiko. —(CARRINGTON.)

Einleitung und Historisches.—Dieser Artikel enthält Statistiken vom November 1899 bis zum 30. Juni 1908. Schätzungsweise 1400 Individuen behandelt. Fort Stanton ursprünglich ein Armeeposten um Apachenindianer im Zaume zu halten. Ausser Dienst gesetzt für Sanatoriumszwecke durch Exekutiv-Order des Präsidenten McKinley am 1. April 1899

Beschreibendes.—(*a*) Geographisch: In der Grafschaft Lincoln in Süd-Central-Neu-Mexiko gelegen. Die Reservationsfläche ungefähr 45 Quadratmeilen, eingezäunt. Grosse Flächen nötig für Rinder- und Pferdepferche.

(*b*) Topographisch: Reservation gelegen an den Ausläufern der "Weissen Berge" mit dem Rio Bonito, der es von West nach Ost in einer Distanz von acht Meilen durchquert, Täler, Hügel und Tafelgelände in sich schliessend.

(*c*) Klimatisch: Klima charakterisirt durch wenig Regengüsse, niederen Feuchtigkeitsgehalt, ausgezeichnete Drainage, trockenen Untergrund, grossen Prozentsatz von Sonnenschein und verhältnismässiges Freisein von hohen Winden, mit kühlen oder kalten Nächten.

Charakter der zugelassenen Fälle.—Fälle in allen Stadien aufgenommen. Starkes Überwiegen der mässigen und weit vorgeschrittenen. Hoher Prozentsatz von schweren Complicationen.

Wohnungen.—Grosse Schlafräume. Zelte und Zelthäuser in Verwendung. Beschreibung der letztgenannten.

Verhinderung von Ansteckung.—Vernichtung des Sputums, hauptsächlich durch Verbrennung.

Tägliche Gewohnheiten.—Beschreibung der täglichen Gewohnheiten in der Leitung des Sanatoriums.

Diät.—Reichlich und abwechselnd mit Überwiegen von frischem Rindfleisch, Milch und Eiern. Kein Zwang zu essen.

Ruhe und Bewegung.—Wichtigkeit der Ruhe. Sorgfalt nötig in Bezug auf Bewegung.

Amüsements.—Unterhaltungen und Amüsements notwendig.

Statistiken und Commentare dazu.—Statistiken die ungefähr 1400 Individuen und 1500 Fälle decken, mit Commentaren dazu.

Sterblichkeit und Erklärung hierzu.—Hohe Sterblichkeit unvermeidlich in hohem Prozentsatz weit fortgeschrittener Fälle. Häufige ernste Complicationen. Hoher Prozentsatz mit früheren schlechten Angewohnheiten und geringem Grade von Intelligenz und Bildung.

Industrielle Züge.—Vorteile des Sanatoriums in seiner Fähigkeit, für reconvalescirende Fälle die Möglichkeit zu bieten.

Behandlung und Schlussbemerkungen.—Die Behandlung verlegt sich nahezu nur auf klimatische, diätetische und hygienische Mittel.

THE PREVENTION OF CONSUMPTION AMONG ITALIAN IMMIGRANTS.

By Dr. A. Caccini,
New York.

Work for the prevention of consumption among Italian immigrants in New York should be conducted along such lines as should enable us to reach aliens from the moment they embark in Italy, step by step, through their residence in this country, until their return abroad—should they feel inclined to return. Such work naturally falls under the following heads: (1) Protection of the healthy emigrant on shipboard. (2) Origin of cases acquired in transit. (3) Local measures for prevention of disease. (4) Should infected immigrants be deported? (5) Personal observations on deported immigrants. (6) Scheme by which, through international agreement, importation of consumption may be prevented.

1. The medical visit and inspection of every immigrant before granting him the privilege of embarking is already a safeguard against the importation of obvious invalids, but it is easily perceptible that a great many of them may already be infected in one or even both lungs and still pass the examination and act as infectious centers among their comrades during the trip, leaving after them the infection hoarded in the bedding, wood-crevices, etc., where it defies ordinary disinfection. There is thus danger to the ship's company, members of which mingle freely with the immigrants, who add to the common danger by frequent habits of smoking and chewing, and, of course, of careless expectoration. It is not a rare occurrence that some of them might be ill with consumption long before this disease could be recognized by the ship's authorities and steps taken toward their discharge.

If we consider the economic factors of emigration, we perceive the likelihood that many emigrants may board the steamer weak in body and mind. The chance of catching cold during the trip easily lays bare the weakest spot to infection, so that, when they land in this country, they have the inception of the disease in their lungs. It all depends upon the environment and economic conditions that they find here whether the protective powers of their body shall gain a victory over the obnoxious bacilli or not.

On arriving, many immigrants go into the country and engage in farming, and with the advantages of the open-air work and wholesome food,

succeed in resisting the infection. Others, however, who stay in large, crowded cities like New York, rapidly fall a prey to the infection acquired on the steamer.

2. In varied and extensive work of four years among such cases I have detected 32 cases, all between fifteen and thirty-five years of age, that undoubtedly acquired infection during their passage to America. After careful, discriminating work which allowed me to rule out any other possibilities, I found that 27 out of the 32 were brought here in old steamers where I could find, on personal inspection, the lack of light and air and cleanliness that favor the permanence of infection in the steerage section as well as in the first class. Such inspection was personally conducted by me on those steamers, both at their start from the port when I was abroad and on their arrival here.

The usual history that I gathered from the 32 cases was that of a cold that started in persons completely healthy before embarking during the first month of residence in this country. I took particular pains to rule out every case that evidently originated in this country. All of them were bound for the country to start farming or to work in the open air. The fact cannot be controverted that 27 out of the 32 came in old, slow ships that did not present all the guarantees of cleanliness, light, and air. Moreover, I took particular pains to exclude from the list any one who had suffered from cold or cough for a reasonable length of time before his departure from the old country; also any one who had consumptives in the family.

3. The present crusade against consumption, widely conducted in this country, when properly enlarged so as to reach all classes and races, will be a sufficient guarantee against the spread of the disease. The Americanization of the immigrant will cause him to come in contact with the political as well as the sanitary laws, and with the institutions whose purpose it is to prevent consumption and care for invalids. I am deeply convinced that the opening of special places where the immigrant can hear his native tongue spoken will help the work considerably; for only the already Americanized children of the immigrants go to the present institutions, while the immigrant himself refuses to go to them, following his natural feeling of diffidence and indifference.

As I became interested in the crusade soon after my landing in this country, I have since very often received statements to this effect from a great many of my countrymen who were eager to obtain access to such a place opened for their benefit. I have at present three petitions gathered in three different Italian sections of New York and addressed to me, asking to obtain from the government the establishment of such places. The petitions were handed to me by a committee formed from the audiences at lectures that I gave in Italian to Italians on the prevention of consumption. Here is a

passage from one of these petitions: "Among us poor fathers and mothers of hard-working families we have unscrupulous doctors and druggists who take advantage of our lack of knowledge of the English language to raise large profits, and, besides this, try to prolong our diseased state to such a point that the poor, discouraged workingman does not know what to do with himself, for he does not know the language and must fall a prey to these speculators."

As an indirect proof of my assertion, there is the fact that a large Italian-, French-, and Spanish-speaking clientele began to come wherever I have been soon after the news spread that a doctor conversant with those languages was at hand.

4. It is always a question of what to do with an immigrant if he falls a prey to consumption—whether to treat him here or to advise him to return to his place of origin. Careful consideration of a number of such cases that I saw here brought me to the conclusion that most of those immigrants find better help if kept here for treatment than if sent home, for the simple reason that many of them leave only helpless people to come to this country.

However, in certain cases I advised them to go back, but this I did only after receiving good information from the other side stating that the family condition and the locality would afford a better chance to the patient. I deny most emphatically the theory of those who assume that a consumptive should be sent back as a public burden before one year of residence in this country. Such persons are just as senselessly cruel and ignorant as any one who refuses help to his old parents after their lives have been entirely devoted to his welfare.

In the mean time, it is equally just to see that whenever a consumptive goes back he be followed on shipboard and isolated from the other emigrants, or, at least, kept under strict sanitary observation, so that he cannot be of immediate danger to the others, or of later danger to future steerage passengers. This carrying out of my advice should become a part of the work of a crusade, not less important than the notification of cases to the local board of health and the proper isolation of consumptives in general hospitals or the disinfection of apartments where consumptives have lived.

5. It has been my practice whenever one of my patients had to board a steamer to notify his departure by letter to his consul, as well as to the steamship company and to the steamer's authorities, namely, the doctor and the captain. In my letter to the consul I urged him to use his authority with the ship's authorities for the isolation of the patient. Besides this, I informed the patient fully about his duties, as an infected person, toward his mates, and instructed him how to behave during the trip as to his expectoration and cough. I furnished him with an adequate number of paper cuspidors for the voyage, telling him to throw them into the ocean after using them.

Some circulars giving instruction to patients from the New York City Board of Health were always given to the patient. Moreover, after examining the patient, joint by joint, I always provided him with a letter to the captain and one to both the company's doctors, and, when present on the steamer, to the Italian Royal Commissioner. I took great care in putting everything up to the patient's conscience as a matter of his interest to take every precaution. I found that the patient was always eager to get information and to learn how to follow it, just as the ship's authorities were to know of his presence and to take proper care for his isolation.

In the case of my communicating with the British consul, the letter was followed by a very pleasing answer, with assurances that steps would be taken by the consulate to see that the sanitary laws would be enforced. In every line that emanated from an Italian port I found the work most satisfactory. It is known that twelve years or so ago the Italian government passed a special bill for the protection of Italian emigrants. By this law every ship which carried emigrants, besides making certain changes for the better care and limitation of the number of emigrants, the creation of special dining-rooms, etc., provided for the establishment of two infirmaries—one for common diseases, the other for infectious diseases. The latter is under the personal care of a medical officer of the navy, who has besides that the control of every one of the passengers and that of the crew and officers abroad, being the "sanitary officer" of the steamer. The sanitary code strictly prohibits the embarkation of a consumptive case, generally speaking, but lately I succeeded in having a resolution adopted to leave their embarkation at the discretion of the Royal Medical Commissioners. Through my friendly relations with all these gentlemen it has been easy for me to get from them the proper permission to take on board cases of consumption which found splendid care in the "infirmary for infectious diseases" under the supervision of the Royal Commissioner. From the latter I have learned how well the patient behaved during the trip, strictly following my directions as to the destruction of the sputum, etc., so that he could be allowed on deck during the day. The infirmary was regularly cleaned and disinfected on the vessel's arrival in Italy.

6. The idea has occurred to me that my private enterprise could be easily transformed into a public one, carried out by the board of health authorities. The sanitary code includes the notification of every case of consumption, enabling the board of health to locate every case of the disease recognized as such. The bill recently passed in Albany enforces the disinfection of those dwellings that were inhabited by consumptives, while the immigration authorities do their best to prevent the landing of cases of consumption that might be overlooked among the passengers. But their effort is continuously frustrated by the steady landing of cases that already bring the

germs with them, for they acquire them on board. This is the greatest danger, for these aliens, with little idea of the new country, its institutions and laws, develop the infection and spread it around long before being recognized and located and, of course, taken care of. While good results are shown in locating and identifying cases here, the main point is, of course, to prevent the importation of the disease.

Through the sanitary authorities proper steps should be taken to control the cleanliness of the immigrant steamers and to provide for their disinfection in regard to consumption. Every case followed in this city should be notified to the steamer's authorities and to the respective consuls of the lines, and the case properly instructed before boarding the steamer. The steamer authorities could easily be compelled to notify the case to the sanitary authorities aboard, just as they would do for any other contagious disease, and they would take the necessary steps to follow up the case. Thus, a broad net would be made of friendly meshes of international control, just as efficient as any international congress could make it. It would probably—some time in the near future, I trust—lead to the creation of an International Board of Health, such as has often been advocated by scientists the world over. I sincerely hope that early in the future our work will have as one result the realization on the part of the people of the fearfulness of consumption, which would cause them to look upon an outbreak of the disease as they now look upon cholera, lepra, and kindred plagues.

It is more or less incumbent on the physician to do away with every artificial barrier of political differences among nations through a continuous interchange of new discoveries and views. Such a work is most important. Official statistics from abroad show the terrific effect of immigration on the increase of consumption, alcoholism, and crime abroad from immigrants who acquired them and return with them to their native villages. If nothing else, this alone should be sufficient to show how good and necessary a work would be done through the adoption of such a plan as the one that I propose.

Here again in prevention, and not in suppression, is the real and most efficient work; it is among the aliens that we must search for the sick, for their power to contaminate is far-reaching in the early stages of the disease as well as in the advanced. The toil of the alien contributes to the wealth of the country. But in the process he acquires consumption and gives it back to us unconsciously. It is for us to preserve our own safety by assuring his.

Italy is following this Congress and its efforts with the greatest interest, for the best part of its population is decimated by consumption acquired by returning immigrants who have worked in crowded American cities. Italian legislation for the prevention and suppression of tuberculosis is the oldest, and centuries ago famous works were written on the subject.

It is my sincere hope that the next Congress will be gathered in Rome.

The year 1911 will mark the fiftieth anniversary of Italian unity. Great preparations are being made for its celebration, and I am certain that the population will give much of its attention to such a gathering as this.

Why Prevention and Treatment of Consumption Among Italian Immigrants in New York are Unsuccessful. How to Remedy It.

According to authoritative statistics of the boards of health of Naples, Rome, and Milan, about 1000 persons die annually from various forms of tuberculosis in each of these cities; the same statistics show that about 10,000 cases of this disease are also constantly in evidence, without taking into account those patients who, being pronounced consumptive, return to their homes in the country after a more or less lengthy sojourn in the densely populated districts. Moreover, these statistics reveal a constantly growing state of morbidity among children, principally due to insufficient nourishment—ignorance in nursing, or inability or disinclination on the part of the mother to nurse.

The Hospital of Santo Spirito in Rome treats annually from 13,000 to 15,000 patients, not counting those cases entered at the Outdoor Department; the Hospital San Giovani in the Laterno receives about 9000 patients, and other hospitals treat a number proportionate to their importance and facilities. The statistics of the new Policlinico—capable of receiving more than 2000 patients—have not yet been published.

It is conceivable that among the vast number of Italian immigrants who annually arrive in New York there must be some incipient cases of tuberculosis among them. These cases rapidly augment under the conditions which the Italians find here—their crowding together in small and ill-ventilated tenements; their lack of proper food required by new climatic conditions, and their general ignorance of the principles of hygiene. To this ignorance of hygiene is added the ignorance of securing proper medical treatment.

In Greater New York there are nearly half a million Italians, principally from southern Italy and Sicily, and consequently from a climate very different from that which they find here. They miss the outdoor life and the oxygen-burdened atmosphere of their native land—which latter allows them to support life on the most primitive forms of nourishment—and these elements are exchanged for the crowded conditions which obtain in the tenement-houses and the ignorant assumption that vitality can still be supported by their native food. Thus their fine physique and natural mental activity—capable of great things under proper conditions—soon degenerate into a mere fight for life, and many of them return home broken in spirit and health.

These conditions are most susceptible to the invasion of infectious diseases; the vitality of the parents being weakened, it follows as a matter of course that the organism of the children acquires poor resistance against those diseases which are peculiar to the young.

Physicians who practise among the Italians are only too well aware of this fact, as they are of the reluctance of the patients to take the fullest advantage of the curative possibilities offered by the local hospitals. This point is emphasized by my own experience:

At the Cornell University Medical College in only a single year there has been admitted a single patient affected by tuberculosis.

At the Manhattan Dispensary for Tuberculosis, conducted under the auspices of the Board of Health, in three months three applied for treatment.

At the Bellevue Hospital Dispensary during the same period of time three patients applied, one of them being a case already mentioned as entered at the Cornell Dispensary.

I believe that this percentage represents fairly the cases entered at similar dispensaries, but it is obvious that it by no means represents the tuberculosis patients present among the local Italian population. We have seen the rate of morbidity in an Italian city of half a million inhabitants. We have also seen the rate for tuberculosis in such a city. In New York, also with half a million Italians, 90 per cent. poor laborers, we note only several hundred registered in hospitals, and of this number only a few are tuberculous. Is it possible that this represents the average morbidity in a population living in less favorable hygienic conditions than in Rome, or Milan, or Naples? It shows that Italians do not go to the hospitals, owing to their social conditions.*

What can be done to alleviate the already stricken, to prevent the disease from spreading, and to fortify the constitution of the Italian immigrant against its encroachments?

*The Italians here retain the medieval system of their own small native villages, preferring to live only among their kind. So that, in a city like New York, they are practically isolated and entirely away from the influence of American institutions. As soon as the Italian arrives in New York, he is met by a fellow-countryman, a padrone (more active than skilful), by whom he is directed in every step of his life. This padrone provides the immigrant with work, and abuses him in every possible manner. When he is sick, the padrone suggests a doctor, and the doctor and padrone both suggest an apothecary, all three of whom take advantage of his incapacity. If he has some money, he is advised to deposit it in a certain bank, and by degrees is deprived of it. So that, when ill, and his money is finally all gone, he is sent to a public hospital, for these speculators have no reason to look after him any longer. In these circumstances the immigrant has no personal initiative, for he knows nothing about New York, its institutions, its benevolent societies, etc. Besides, the English language is entirely unknown to him, for he has been dealing only through interpreters. Under such conditions, we may argue how many more tuberculous patients are to be found in half a million Italians in New York than in half a million in an Italian city? Nevertheless, a very small proportion of them succeed in finding institutions and in going to them. But these are principally Italians born in America, who know the language.

As the Italians show a disinclination to avail themselves of the help to be derived from American institutions, we must ourselves break into their Chinese wall; we must go to them and forcibly show them how they may be benefited.

The idea has occurred to me that it would be possible to open a dispensary in the Italian quarter especially for the treatment of tuberculosis, where, for certain hours during the day, Italians could find a physician and nurses speaking their own language, and both able and willing to give not only treatment for the cure of the disease, but also advice on hygiene which would cause the patient to understand his or her responsibility toward intimates and friends. Besides such help as the dispensary could offer, the nurses might visit the patient in the home, give advice there, and obtain valuable information which might be availed of by the board of health.

Such an institution, if properly directed, would not cost more than $5000 a year, and might, as its value was demonstrated, increase its functions through branches in various parts of the city. Tuberculosis patients among the Italians would naturally incline toward such an institution; they would learn the menace they are to the community through expectoration and other causes, and would become conscious of their responsibilities, while others now healthy would learn, and gladly learn, how to protect themselves from infection.

An important auxiliary to the scheme would, it seems to me, be the public lectures on the prevention of tuberculosis which I am giving in the Italian language in various parts of the city under the auspices of the Committee on the Prevention of Tuberculosis of the Charity Organization Society and the Board of Education. The results of these lectures show me that the Italian is ready and quick to learn and eager to avail himself of advantages when offered under trustworthy and authoritative auspices. On the close of a lecture many poor Italians have come to me asking where they could find help. Their ignorance of the language, their complete ignorance of the city and its institutions, cause them to fall an easy prey to their own more crafty countrymen who would benefit themselves by their misfortunes. Nor would the Italian language suffice if utilized by American physicians and nurses, for many of the Italians here speak only their own dialect, and would scarcely understand classical Italian as spoken by a foreigner. Many times they have said to me: "Oh, Doctor, I wish you would persuade those gentlemen [the Committee on the Prevention of Tuberculosis and the Board of Public Instruction] to open a place in our quarter where we may hear how to cure ourselves in our own language—where we may hear and understand what is best to do for ourselves and for our neighbors."

For these reasons I think it would be advisable to open a place solely

for the Italian tuberculous patient under the conditions indicated—where the Italian might hear his own language or dialect, where patients might be received from other clinics, and where the rules should be those observed in kindred dispensaries, the entire scheme being placed under some public administration.

With the establishment of such an institution, the press and the local Italian consulate would give the required publicity among the local Italians. Moreover, I can promise coöperation, through personal friends, of the Italian Ministry of Foreign Affairs and of the Italian Embassy in Washington.

With increasing work, the really paramount function of medical science, that of prevention of disease, could be conveniently and advantageously augmented. Interesting illustrated lectures could be given at various hours, and the knowledge thus entertainingly imparted would be sure to spread among the Italian population, causing Italians thereby to seek the most convenient means of cure, to be inspired with an intelligent apprehension of infection and an effective method of prevention.

Pourquoi les Efforts pour prévenir et traiter la Phtisie parmi les Immigrants italiens n'ont pas eu de Réussite.—(CACCINI.)

Les villes italiennes d'une population d'environ 500,000 habitants (Rome, Naples, Milan, etc.) ont une moyenne de mille fatalités annuellement par la phtisie. Il y a 10,000 personnes, infectées de la phtisie, qui vivent dans les grandes villes de l'Italie.

Les statistics des hôpitaux alliés de Rome donnent de 13,000 a 15,000 par an affectés par cette maladie.

A New York avec une population italienne de 700,000 de 2000 à 3000 sont traités dans les hôpitaux. Cette population est composée presque entiérement par de pauvres immigrants.

Pourquoi cette différence?

Les Italiens de New York vivent entre eux avec mœurs et des idées du moyen-âge, entourés par des speculateurs sans scrupules. Leur ignorance de la langue et des institutions du pays donnent la meilleure chance du monde aux speculateurs pour les abuser sur tous les points. La différence du climat et de la nourriture, le manque d'air frais contribuent à créer un pourcent très haut de morbidité et de mortalité parmi eux; la tuberculose sévit. Bien peu d'Italiens affectés par la phtisie se font traiter aux institutions américaines. Dans trois des plus grandes institutions on n'a eu que 8 applications dans une année et celles-là par des Italo-Americains.

Quelle devrait être la proportion en comparaison avec les villes italiennes ayant une population composée de 90% de laboureurs?

Les raisons pour lesquelles ils ne frequentent pas les institutions sont les mœurs du moyen-âge et les speculateurs.

Rémèdes:

Américanisation des Italiens, dispensaires italiens dans les quartiers italiens ayant un corps de médecins parlant l'Italien.

Plans pour le dispensaire. Le dispensaire pourrait être rendu attractif par des séries de réunions sociales et par des lectures.

J'ai reçu beaucoup de pétitions dans ce sens après mes conférences sur l'hygiène et la prévention de la phtisie.

Une institution de ce caractère coûterait à peu près $5000 par an.

Que cette idée est praticable est prouvé par le fait que beaucoup de tuberculeux se sont presentés lorsque j'étais attaché a des institutions américaines. Ils ont expliqué qu'ils se sont presentés en sachant qu'on pouvait les comprendre.

Warum Verhinderung und Behandlung der Schwindsucht unter den italienischen Einwanderern in New York ohne Erfolg ist.—(CACCINI.)

Italienische Städte von ungefähr 500,000 Einwohnern (Rom, Neapel, Mailand, etc.) haben ungefähr 1000 Todesfälle von Schwindsucht im Jahre. Es leben beiläufig zehntausend Fälle in grossen Städten.

Statistiken des Hospitalverbandes von Rom geben 13,000 bis 15,000 kranke Personen im Jahr an.

In New York werden von 700,000 Italienern 2000–3000 in Hospitälern behandelt. Die Bevölkerung besteht fast ausschliesslich aus armen Einwanderern.

Woher kommt nun dieser Unterschied? Die Italiener in New York leben in schlechten Quartieren mit mittelalterlichen Gebräuchen und Ideen, umgeben von gewissenlosen Spekulanten. Ihre Unkenntnis der Sprache und Einrichtungen giebt den Spekulanten die beste Gelegenheit, sie in jeder Hinsicht zu missbrauchen. Der Unterschied in Klima, Nahrung, Mangel an frischer Luft, alles dieses erhält einen hohen Prozentsatz von Kränklichkeit und Sterblichkeit unter ihnen, und die Schwindsucht schnellt in die Höhe.

Sehr wenige italienische Schwindsüchtige gehen nach amerikanischen Heilstätten. In drei der grössten Institute suchten nur acht Fälle Aufnahme und diese waren Italo-Amerikaner.

Was sollte aber das Verhältnis sein im Vergleiche zu italienischen Städten mit einer Bevölkerung von 90% Arbeitern?

Die Ursachen, dass Heilstätten nicht häufig aufgesucht werden, sind mittelalterliche Lebensgewohnheiten und Spekulanten.

Abhilfe:

Amerikanisierung der Italiener, italienische Ambulatorien in den italienischen Quartieren mit italienisch sprechendem Personal.

Plan für solch ein Ambulatorium.

Gesellschaftliche Unterhaltung und Vorträge würden diesen Platz zu einem anziehenden Mittelpunkt machen.

Es sind, um dies zu erreichen, viele Zuschriften an mich gekommen nach Vorlesungen über Hygiene und Verhütung der Schwindsucht.

Kosten veranschlagt auf jährlich $5000.

Die Durchführbarkeit dieser Idee ist durch die Tatsache bewiesen, dass eine grosse Menge Schwindsüchtiger kamen, wo immer ich an einer amerikanischen Anstalt zu tun hatte. Sie gestanden ein, dass sie deshalb kamen, weil sie wussten, dass sie verstanden werden würden.

TUBERCULOSIS IN THE PHILIPPINES.

By Fernando Calderon,
Professor of Obstetrics, Philippine Medical School, Manila, P. I.

People of the Philippine Islands have not escaped the baneful influence of tuberculosis; for, like other countries, the archipelago pays a tribute of victims to this terrible enemy of the human race. The mortality from tuberculosis in the provinces of the archipelago is extremely large, but it is almost impossible to state with accuracy the annual average of deaths due to this cause. This difficulty is due to the fact that many of the towns are far from lines of traffic, and in most of them there are no resident physicians who could undertake the gathering of demographic statistics for each community. Such statistics naturally form the indispensable basis of medical geography, and, owing to the prevailing conditions, this is a branch of science as yet unknown in the remote regions of the far East.

In preparing this paper I have had recourse to the records of as many institutions as seemed capable of throwing some light on the subject, but because it has been entirely impossible to secure statistics on tuberculosis from the rest of the archipelago I have been obliged to limit myself to those showing the movement of tuberculous cases in the city of Manila.

The following figures are taken from the records for the Bureau of Health, from those of the Army Medical Department, and from the general hospitals of Manila, namely, the Civil Hospital, the Hospital of San Juan de Dios, and that of St. Paul. They are sufficiently high to indicate that tuberculosis is a very important etiological factor in the mortality occurring in this tropical climate.

TABLE I.—RECORD OF CASES ADMITTED FOR TREATMENT AT THE CIVIL HOSPITAL, MANILA, BEGINNING WITH THE FISCAL YEAR ENDING JUNE 30, 1902.

Fiscal Year.	Total Patients.	Tuberculosis.	Per Cent.
1902	1,870	12	0.64
1903	2,295	24	1.04
1904	1,895	32	1.68
1905	1,641	30	1.82
1906	1,523	24	1.57
1907	1,310	23	1.75
1908	1,487	35	2.35
Total to June 30, 1908	12,021	180	1.49

However, the above does not include tuberculous cases who came to the hospital for treatment, but who were not admitted as patients. It must also be considered that the patients are a select class and largely European.

TABLE II.—RECORD OF TUBERCULOUS CASES ADMITTED FOR TREATMENT AT ST. PAUL'S HOSPITAL, MANILA, DURING THE YEARS 1905, 1906, 1907, 1908, SINCE ITS ESTABLISHMENT IN APRIL, 1905.

Year.	Total Patients.	Tuberculosis.	Per Cent.
1905	..	36	..
1906	..	86	..
1907	..	71	..
1908	..	43	..
Total	5,103	236	0.62

This low percentage of tuberculous cases admitted to St. Paul's and the Civil Hospital is perfectly accounted for by the fact that most of the poorer people in Manila, on deciding to enter a hospital, go to the Hospital of San Juan de Dios, where it is easier to secure admission, rather than to the two above-mentioned institutions, where the technical personnel makes a careful selection of the clinical cases.

This is not the case with the medical and surgical dispensary established on August 27, 1907, under the auspices of the Philippine Medical School, in the building of St. Paul's Hospital. To this dispensary are admitted as out-patients, and given free medicines, all sick poor who present themselves to consult a physician. The following table shows the percentage of tuberculosis among these patients:

TABLE III.—DISPENSARY OF THE PHILIPPINE MEDICAL SCHOOL.

Period.	Total Patients.	Tuberculosis.	Per Cent.
1907			
August 20 to 31	51	8	1.56
September	150	22	14.66
October	187	23	12.29
November	175	23	13.14
December	120	18	15.00
1908			
January	174	20	11.49
February	185	22	11.89
March	195	12	6.15
April	145	17	11.72
May	160	18	11.25
June	202	24	11.88
Total	1744	207	11.86

This percentage (11.86) approximates that recorded at the Hospital of San Juan de Dios.

TABLE IV.—STATISTICAL ABSTRACT SHOWING THE NUMBER OF ADMISSIONS AND THE PROPORTION OF TUBERCULOUS CASES AT THE HOSPITAL OF SAN JUAN DE DIOS DURING THE FIVE YEARS 1903 TO 1907 INCLUSIVE.

Race.	Total Patients.	Tuberculosis.				
		Pulmonary.	Laryngeal.	Abdominal.	Other Regions.	Total.
Filipinos.....	6591	857	31	23	27	938
Europeans.....	2357	66	5	3	7	81
Total.....	8948	923	36	26	34	1019

The total percentage of tuberculous patients is 11.89. An abrupt and remarkable increase over this proportion of tuberculosis is seen in the hospitals of Bilibid Prison, the principal penal institution of the Philippines. The annual report of the Bureau of Health for the year ending June 30, 1907, gives the following figures:

TABLE V.

Prisoners Sick.	Tuberculosis.	Per Cent.
326	153	46.6
Deaths.		
180	58	32.2

However, the percentage of tuberculous patients compared with the total prison population is only about four. The insular government, in view of the number of tuberculous prisoners, has deemed it necessary to separate the tuberculous and non-tuberculous patients. This has been done by housing the sick in two buildings entirely independent of each other, namely, hospitals A and B, with a view to preventing the spread of tubercular disease among the inmates of the prison.

On the other hand, the proportion of individuals attacked by tuberculosis among the American troops stationed in the islands is comparatively low, as the following report will show:

TABLE VI.—REPORT OF CASES OF PULMONARY CONSUMPTION OCCURRING AMONG AMERICAN TROOPS IN THE PHILIPPINES DURING THE FISCAL YEARS 1903 TO 1908 INCLUSIVE.

Year.	Strength of Command.	Number of Admissions.	Per Cent.
1903.....	37,768	192	0.508
1904.....	23,818	104	0.437
1905.....	11,966	65	0.541
1906.....	11,057	64	0.579
1907.....	11,885	68	0.549
1908.....	12,802	64	0.499

TABLE VII.—DEATHS FROM TUBERCULOSIS IN THE CITY OF MANILA BY QUARTERS.

Bertillon's Number.	Diseases.	1903.				1904.				1905.				1906.				1907.				
		First.	Second.	Third.	Fourth.	First.	Second.	Third.	Fourth.	First.	Second.	Third.	Fourth.	First.	Second.	Third.	Fourth.	First.	Second.	Third.	Fourth.	First.
	Total number of deaths for the year	9358				10,337				8741				9182				7281				
	Total number of deaths	1652	1911	2710	3085	2256	2350	2962	2769	1856	1649	2601	2635	1932	1848	3468	1934	1569	1280	1936	2502	2570
26	Tuberculosis of larynx	11	16	11	5	14	29	16	26	8	12	9	3	2	8	3	7	5	3	2	2	5
27	Tuberculosis of the lungs	161	219	199	261	233	254	230	241	238	234	293	260	273	296	388	284	249	227	239	258	272
28	Tuberculosis of meninges	3	4	4	6	4	11	14	10	5	6	11	12	7	11	16	11	8	9	7	13	7
29	Abdominal tuberculosis	12	7	9	8	10	10	8	16	9	9	11	11	7	10	17	12	9	7	8	12	8
30	Pott's disease	0	1	0	0	1	1	0	0	0	2	0	1	0	0	0	0	0	0	1	0	1
31	Cold abscess and abscess by congestion	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
32	White swelling	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
33	Tuberculosis of other organs	2	0	1	1	0	0	0	1	3	2	2	1	3	1	3	2	1	1	1	2	2
34	General tuberculosis	0	1	3	2	5	4	4	3	1	3	10	5	5	6	11	5	4	3	8	9	15
35	Scrofula	3	1	3	5	1	1	1	0	1	4	5	2	0	2	5	0	3	1	0	0	1
	Total tuberculosis mortality	193	250	232	288	269	310	273	298	265	272	341	295	297	334	443	321	280	252	266	296	311
	Percentage of total mortality	11.68	13.02	8.56	9.33	11.92	13.19	9.21	10.76	14.27	16.49	13.11	11.19	15.37	18.07	12.74	16.59	17.84	19.68	13.73	11.83	12.10
	Total tuberculosis mortality for the year	963				1150				1173				1395				1094				..
	Percentage of annual mortality	10.27				11.12				13.41				15.19				15.01				..

The above figures, during the last two years (1906 and 1907), show that the mortality in Manila from tuberculosis, compared with the total mortality, was 15 per cent., which, on comparison with the 10.68 per cent. of the United States, the 9.7 per cent. of England, and the 9.1 per cent. of Prussia, is seen to be a high proportion.

This figure of 15 per cent. certainly does not include all the cases of tuberculosis developed in Manila, as many individuals suffering from tuberculosis die of some intercurrent disease. The results of the first 150 necropsies made in the morgue of the Philippine Medical School by Dr. Philip K. Gilman are as follows:

TABLE VIII.—TUBERCULOSIS AT AUTOPSY.

Number of Necropsies.	(*a*) Died of Tuberculosis.	(*b*) Tubercular Lesions in those Dead of Other Causes.	(*c*) Total
150	47	13	60

Per cent. of (*a*)	31.3
Per cent. of (*b*)	8.7
Per cent. of (*c*)	40.0

The figures which have been quoted lead me to the conclusion that at least 25 per cent. of the sick in the city of Manila are affected with tuberculosis, the pulmonary form strongly predominating.

What are the principal causes of this wide dissemination of tuberculosis in the Philippines? It is not my intention here to enter upon a general discussion of the question, but I shall confine myself to certain local peculiarities, directly related to the tuberculosis problem, which are due to the nature, habits, and customs of the Filipino people.

There exists among the lower classes, and even among many cultivated families in the Philippine community, the densest ignorance regarding the existence of bacilli in the sputum of patients suffering with pulmonary tuberculosis, and of the transmission of the disease by means of the expectorated material in a dry and pulverized state. Owing to this ignorance, there continue from generation to generation in this country insanitary domestic and social customs which favor the development and spread of tuberculosis. It is very common for the families of the poorer and middle classes to sleep together in a single room, which is not always large, the occupants lying on the floor itself with nothing but a single mat between it and the person of the sleeper, known by the name of *petate*. If a tuberculous person lives in the household, where he deposits his sputa on the floor, it is not to be wondered that infection is conveyed to other members of the family.

At meal-time the whole family gathers around the *dulang*, or table especially intended for serving, and each individual takes up his food from a common dish with the five fingers of his own hand, which he has not washed beforehand and which retain under the nails a rich microbian flora. A single spoon, used to take up the liquid articles of food, passes from mouth to mouth. There are Filipino households in which drinking-glasses are replaced by the traditional *tabo*, a utensil made of the shell of the cocoanut, which is the only vessel in use, and, as it passes from hand to hand and lip to lip, sometimes serves as an excellent vehicle for the transmission of tuberculosis. A pleasing manifestation of Filipino politeness and hospitality is the custom in vogue in every house of offering to visitors cigars, cigarettes, and betel-nut, but these articles, at the same time that they meet the requirements of courtesy in social intercourse, occasionally transmit Koch's bacillus, especially when some member of the household is afflicted with tuberculosis.

Where tubercular infection exists in this country, one of two things may occur: either the victim may die without having received the services of a physician, after having served as a permanent focus of infection for the persons about him; or his family may call in the services of an untitled doctor, quack, or healer with herbs, who, on entering the household, charged with the sacred mission of curing the sick, not only fails to help the situation, but sometimes unintentionally serves to spread tuberculosis in carrying out some of the irrational practices of his empirical therapeutics. Among these I will mention one which consists in making, on the arms or thighs, fonticuli from which issues prolonged and abundant suppuration, which weakens the body and converts it into an excellent field for the reception and multiplication of pathogenic microörganisms, including the bacillus of Koch. It may easily occur that the quack himself is a perambulatory victim of tuberculosis who carries the infection from place to place, and who plays an extremely important rôle as a vehicle of infection every time he uses on his patients the primitive measure termed *buga* by the natives. This proceeding consists in the grinding and mastication, between the teeth of the quack, of vegetable substances such as leaves, flowers, fruits, and the roots and sap of certain medicinal plants, all of which, after mixture with the saliva, is spat out directly from the mouth of the healer upon the part supposed to be diseased. This remedy is especially applied to wounds, ulcers, erysipelas, phlegmon, eczema, lupus, etc. Some Chinese and native laundrymen have a similar practice, which consists in blowing out mouthfuls of water in a spray over starched clothes to moisten them while they are being ironed. Both practices are favorable to the transmission of Koch's bacillus when the mouth from which the medicinal herbs or the water issues happens to be that of a person suffering from tuberculosis.

Another ordinary means of transmission of the infection is common in the

Philippines. I refer to the habit of kissing. It is a custom learned from Spanish ladies, and current among Filipino women of good social position, to kiss each other being a proof of affection. Ignorant of the danger which they are incurring, Filipino women of high position greet each other with a kiss at meeting and parting; and it may be that one or the other has the infecting agent present. This habit is practised not only by women among themselves, but also by Filipino children, many of whom are probably infected with tuberculosis in this manner. How often the parents themselves have encouraged their children to kiss tuberculous visitors who take with them everywhere the infection seated in their lungs! And how often the parents themselves have placed, unintentionally, the fatal germs of tuberculosis on the fresh lips of their tender children!

The religious fanaticism inculcated since remote times in the Filipino people has sometimes gone beyond the limits of reason and hygiene, by organizing pilgrimages during which thousands of persons journey far to fall on their knees and to kiss the feet of some miracle-working saint venerated on the altars. Up to this point there is nothing extraordinary in the practice; it is merely a manifestation, more or less worthy of respect, of the religious spirit. However, the principles of prophylactic hygiene are entirely isolated when thousands of lips, belonging to thousands of mouths of all sorts, pass in succession over those unwashed and not disinfected feet; some of these will, in the act of mumbling a prayer, assuredly leave behind the tubercle bacillus with its terrible consequences. The same may be said of the mystical kisses which many pious Filipinos imprint on the dusty floors of the churches.

Side by side with the religious fanatics, there exists among the Filipinos an almost fanatical addiction to the vice of cock-fighting. A very great number of natives give their most solicitous care to the fighting-cock, destined to combat in the public cock-pits, and these birds are subject to a laryngeal disease,* the symptoms and treatment of which I shall briefly set forth. The cock opens its mouth frequently and shows loss of appetite and distress upon swallowing. A simple inspection of the mucous membrane of the fauces demonstrates the presence of bleeding, grayish granulations, the size of millet-seeds, which multiply rapidly and spread toward the pharynx, larynx, and trachea, the process being accompanied by great emaciation of the cock, which progressively loses its voice and appetite, and ends by being unable even to swallow water, owing to acute dysphagia. The animal finally dies.

The disease is contagious to such a degree that the other fighting-cocks tied in the neighborhood of the sick one run the gravest risk of being infected. Such a result has been recorded in many cases, so that it is necessary

* This disease is known among the Tagalogs by the name *sampaga*.

to adopt energetic measures of isolation and disinfection to stop the spread of the disease.

Customary treatment of this disease consists in placing on the granulations themselves a topical application composed of lemon-juice and the resin of *tuba-tuba* and *pandacaque*, mixed with a strong alum solution—a remedy which does positive good only when the infection is carefully treated from the very start, and is perfectly useless in causes already advanced.

The etiology of this contagious affection is as yet unknown, but it would be interesting and useful to make a bacteriological study of it, for it may possibly be a form of tubercular disease in the birds, and transmissible to man, especially to the Filipino, who lives at home in intimate contact with his fighting-cock.

I will now give a brief résumé of the measures which have been adopted by the insular government to stop the spread of tuberculosis in the Philippines.

If it be a recognized principle of public hygiene that the sanitation of towns is in inverse ratio to the development of tuberculosis in them, it must certainly be admitted that the prevalence of tuberculosis in the Philippines, great as it still is, must have diminished in the course of the past decade.

In making this statement, which may possibly appear gratuitous, it would, of course, have been desirable to prove its truth with comparative statistical data derived from the two régimes—the Spanish and the American; but this meets with the insuperable difficulties arising from the fact that during the late régime the few demographic statistics that were collected did not always show the real conditions, owing to the circumstance that they lacked the basis of this line of study, namely, a good census of the population.

Under American sovereignty very striking sanitary enterprises have been undertaken with great perseverance, both in Manila and in the other cities of the archipelago. To confine ourselves to Manila, it can truthfully be said that its old streets have, as a rule, been put in good condition; some have been widened and converted into broad avenues, while the muddy ponds and pestilent pools of stagnant water, which during the rainy season were excellent breeding-grounds of frogs and mosquitos, to the detriment of the public health, have been removed in the central portions of the town. Clean, well-planned streets have been opened, to the great satisfaction of the citizens, across wide areas of what formerly was low, muddy land which has been changed into fine, well-drained, modern suburbs or "additions." The deep depressions, full of slime and a thick growth of wild vegetation, that surrounded the old walled city, have ceased to be the home of toads and snakes; they have given place to the modern, sanitary boulevards that the municipality is building. A number of the sluggish tidal creeks, known as esteros, that run through the city, their blackish waters charged with the waste and excreta of the population, have been canalized, and others have been filled,

the new soil well packed down, and streets constructed in their stead. Plazas, parks, and public gardens, shaded with fresh, luxuriant vegetation, have multiplied, and form health-giving breathing-places for the poorer classes.

The public markets have been modernized and put in sanitary condition. They are no longer places for the sale of household necessities, and at the same time collections of huts and shacks for the shelter of men and beasts who deposit their excreta on the spot. The number of markets has been increased, new ones being built in the outlying portions of the city, and it may be said that all these public places for the sale of the daily food of the population compare favorably in drainage and cleanliness with similar establishments in Europe and America. As a culmination of these sanitary labors, the city has almost finished a modern sewer, and an enlarged waterworks system will soon afford Manila an abundant supply of pure water.

This same sanitary campaign has been extended to the provinces, although on a smaller scale. It may be said that an honorable rivalry exists among them in putting their respective towns in the best sanitary conditions that their pecuniary resources will allow. All the provinces have heartily assisted in the plan adopted by the general government of sinking artesian wells for drinking purposes. These wells already flow in many towns, and the result on the public health has been gratifying.

Despite the progress already made during the very short period of the American régime, it is well to state that there still remain many unsolved questions included in the absolutely vital problem of sanitation, and directly related to the propagation of tuberculosis and other infections.

One of these consists in the pressing necessity of filling in and draining many marshy tracts in Tondo, the most populous quarter of Manila. Over these marshy tracts all huddled together hundreds of unsanitary dwellings almost touching the slime, dwellings that serve as permanent foci of infectious diseases such as cholera, tuberculosis, beriberi, malaria, etc. A similar problem is that of the urbanization and widening of certain alleys, miscalled streets, in the St. Nicholas district. In all these unhealthful places live hundreds of poor families, in unsatisfactory, badly ventilated dwellings, who suffer the heaviest loss not only from epidemic but also from endemic diseases in general, and tuberculosis in particular, which silently decimates their numbers.

There is no doubt that the construction of special suburbs or quarters for these poor people, who for the most part belong to the laboring class, together with cheap but sanitary houses, would improve the condition of the city, and in particular would diminish the contingent of victims of tuberculosis.

This consideration takes us naturally to the question of what the Philippine government has done, during American occupation, and what still re-

mains for it to do, in order so to alleviate the condition of the people as to prevent their becoming foci for the spread of the disease among their fellow-citizens.

Candor obliges me to confess that up to the present moment there has not been begun in the archipelago a real antituberculosis campaign, which would have much effect in limiting the spread of the disease. All that has been done by the Bureau of Public Health has been the distribution of bulletins and circulars concerning the nature of the disease, its effects, prophylaxis, and means of propagation, and an effort has also been made on the part of schools, churches, and factories to have an ample provision for cuspidors and other receptacles for the sputa of the diseased. The sanitary regulations of the city of Manila forbid expectoration on sidewalks and the public plazas, and earnestly recommend the use of tuberculin on dairy cows. Very recently, also, the public schools have been spreading some information regarding the propagation of tuberculosis.

This delay on the part of the health authorities in attacking the tuberculosis problem is quite intelligible when it is remembered that since the institution of the Board of Health in October, 1901, and its change into the Bureau of Health in 1905, all its activities have been concentrated on the limiting of cholera, smallpox, bubonic plague, and leprosy, which are perennial scourges in the Philippines, and practically all the money yearly appropriated for this bureau has been spent in fighting these dangerous and communicable diseases.

I must repeat that in this matter the Filipino people are extremely ignorant. They do not know that Koch's bacillus exists, or that the sputum of the sick is the vehicle of transmission, or that there is any necessity of guarding one's self against the contagion. The Philippine government, therefore, would be carrying out a humanitarian duty in teaching that people the danger they run from this terrible disease.

It is not enough to direct the schools to give the children instruction on this point, or to distribute among people who never read bulletins on tuberculosis, written with more or less skill. One thing more is needed, namely, a direct, active propaganda carried on by popular lectures given in the native dialects at central points, and these lectures must not only explain the various modes of transmission of the disease, they must also insist on the urgent necessity of changing certain deep-seated native customs that lend themselves to the transmission of Koch's bacillus.

There should be organized for this purpose, in the capital of the archipelago, a central propaganda committee—a kind of antituberculosis league. This committee should stimulate the zeal of those Filipino or American physicians who know some one of the native dialects, and should invite them to give one or two lectures a month in their respective places of residence.

It is true that in most of the towns there is no physician, but this difficulty may be overcome by assigning the task to some educated person, such as is to be found in all towns, and assisting him with copies of manuals written for the purpose. In this connection it is to be said that the insular government, in response to the long-felt want of physicians in the provinces, has created a Philippine school of medicine, with a modern course of instruction. It has made liberal appropriations for the construction of a splendid medical school and a new general hospital with modern clinics. The new buildings, now under construction, will be finished in a year and a half, and will undoubtedly be among the largest and finest in the far East. Beside the new hospital and medical school under construction there stands the impressive building of the Bureau of Science, a center of scientific work from which have issued very notable original studies on various phases of tropical diseases. It serves, indeed, as the right hand of the Bureau of Health in all the campaigns against epidemics and many diseases hitherto unknown, and also an ample means of practical instruction to all Filipino youths who are studying for the noble profession of medicine. An examination of the brilliant articles of the "Philippine Journal of Science" will bear out the truthfulness of my eulogy.

However, if the insular government wishes to supplement adequately the efforts of the above-mentioned powerful means for preserving public health, it should also establish, for a methodical campaign against tuberculosis, the following institutions:

1. Special dispensaries for the tuberculous. At these dispensaries physicians should not only give medicines but professional advice regarding the manner of life of the patients and their conduct in social relations with their fellow-citizens, so that these dispensaries may serve as true schools for the campaign against tuberculosis.

2. A sanatorium for advanced cases should be erected in the outskirts of the city, on a high and properly conditioned site.

3. In the mountains of Luzon, in Benguet and Lepanto-Bontoc, one or more sanatoriums for incipient and only moderately developed cases should be built.

4. On the shore of the sea one or more sanatoriums for tuberculous children and patients with scrofulous symptoms should be erected.

If the Philippine treasury prove equal to the expense of establishing these institutions and the insular government vigorously undertake the task, within a few years we should see a rapid diminution of the present appalling mortality from the disease, and the American régime would have the honor of solving one of the greatest medico-social problems of the Philippines.

WHAT STATES, COUNTIES, AND MUNICIPALITIES MAY DO TOWARD THE ERADICATION OF TUBERCULOSIS.

By W. H. Sanders, M.D.,

Health Officer of Alabama.

Accepting the teachings of science as to the causation and propagation of tuberculosis, the practical and pressing question is: How shall the disease be eradicated? and especially what may be done by the States, counties, and municipalities of this country for its eradication?

The answer can be broadly formulated in the following words: Education, legislation, and money.

These being the forces upon which success will depend, the vital question is: How and by whom shall they be employed?

It goes without saying that medical men must be the educators; at least, they must be the leaders and directors of this force, the vigorous and judicious employment of which must precede, prepare the way for, and bring about the utilization of the two other forces mentioned.

Unless the people be taught the great truths in regard to the pathology and prevention of tuberculosis, they will not enact the legislation, or furnish the money, necessary for conducting a fruitful and successful crusade against the disease. This education must be effected by public lectures and by the distribution of literature.

That lectures by medical men on medical subjects frequently fail to attract audiences of laymen is well known, but may not the fault often lie with the lecturers, and not with the people? If a medical man discusses a medical subject in a dry, technical way and talks above the heads of his hearers, is it a wonder that he makes a bad reputation for himself, and for his profession too, as an entertainer and instructor on such subjects? Obviously, the remedy is for medical men to tell popular audiences the great salient truths in regard to tuberculosis in such way as to capture their attention and to reach and satisfy their understandings; then they will listen and learn, and will go away resolved not only to help in the great cause of eradication themselves,

but to become missionaries in propagating the spirit of coöperation to others. May the writer be pardoned for referring in this connection to some aids he has employed with good effect when addressing popular audiences on the subject of tuberculosis? One of these is to present to the eye a representation of tubercle bacilli sufficiently enlarged to admit of being seen from all parts of an ordinary hall, and to explain that the picture presented is a magnified representation of what is seen under the microscope when an examination of tuberculous sputa is made.

Such a picture at once relieves the tension on the imaginations of laymen as to the appearance of tubercular germs and satisfies their understandings far more effectually than any mere verbal description of tubercle bacilli, however good, can possibly do.

Another aid employed, and a very satisfying one to laymen, was to pass around through the audience one or more culture-tubes containing tubercle bacilli actually growing, and therefore visible *en masse* to the unaided eye. The final and crowning aid which a lecturer on tuberculosis can furnish in order to interest and instruct laymen is to exhibit specimens of the bacilli under the microscope. This can and should be done whenever time and the size of the audience admit of such a demonstration.

Without dwelling longer on how to get audiences to listen to lectures on tuberculosis, it may be added that many audiences, and of the best, can be had for the asking. This is true of the schools and colleges and of many of the social and literary clubs of the country. The lecture-field can be very greatly enlarged if medical men will avail themselves of opportunities of addressing audiences assembled for other purposes. While such audiences might not assemble primarily to hear an address on tuberculosis, yet, being assembled, they would no doubt often listen complacently and with profit to short and pithy talks on the subject.

I cannot leave this division of the subject without emphasizing the almost boundless opportunities medical men enjoy for educating the people on the subject of tuberculosis when officiating in that closest of all professional relations, namely, as family physician. Here they should occupy the dual position of physician and teacher, and should never lose an opportunity of sowing the seeds of such knowledge in regard to tuberculosis as will take deep root and spring up and bear fruit manifold.

The distribution of literature on the subject of tuberculosis ought to be, and will be, a very potent means of reaching and educating the people. The press should be appealed to for the use of its columns, and judging by its readiness to help in other good causes, such an appeal would not be in vain. Indeed, its aid is indispensable, for, as a molder of public opinion, no other influence is comparable with it, as its messengers are daily going to the firesides of the people, and any good cause it advocates and continues to advo-

cate will sooner or later prevail. In addition to using the press, short, crisp, and clearly written brochures and leaflets must be scattered broadcast until they reach every household of the land and carry into them such a knowledge of tuberculosis as will rouse up a profound and unalterable resolution on the part of the people to assault the enemy wherever found, and to continue the assault until his strongholds are captured and he is in full retreat.

While the education of the people is the first step to take in the campaign against tuberculosis, and is one that must be taken in order to render the other steps possible, yet no amount of education will of itself achieve the results we all so earnestly desire.

The second of the three essential forces mentioned, legislation, must be invoked in order to make any considerable progress in exterminating tuberculosis. Without it, all other efforts will be powerless and fruitless. While legislation may cover a tolerably wide range, the following laws are essential and must be enacted:

1. A law requiring that every case of tuberculosis, both in man and animal, shall be reported to the health authorities and classified.

2. A law providing for the establishment of State, county, and municipal sanatoriums for the treatment and care of the tuberculous.

3. A law requiring that all houses or places that are habitually occupied by tuberculous persons shall, at proper intervals, be thoroughly and scientifically disinfected, and finally disinfected when such occupancy ceases.

4. A law requiring that all places where large numbers of persons are congregated together, such as school-houses, colleges, manufacturing establishments, business houses, mines, etc., shall, at proper intervals, be rigidly inspected for the purpose of ascertaining whether the ventilation is adequate and other hygienic conditions good; also, whether any of the inmates show evidence of being tuberculous.

5. A law requiring that all persons known to be tuberculous, and who are allowed to pursue their ordinary avocations, shall comply with such prescribed rules as will prevent them from becoming a menace to others.

6. A law imposing a heavy penalty on landlords, or the agents of landlords, for selling or leasing a house that has been occupied by a tuberculous person unless adequate proof be furnished that such house has been thoroughly and scientifically disinfected.

7. A law authorizing boards of health to prescribe the rules with which tuberculous persons shall comply, whether they be in their own homes or in sanatoriums—all of which legislation must proceed from the legislatures of the several States.

Brief comment will now be made on the first and last pieces of proposed legislation, and in another connection the second piece will be defended. The reasons for the remainder are self-evident.

The need of a law requiring that every case of tuberculosis shall be reported is imperative, and when such a law is enacted, it must be inflexibly enforced.

Obviously, the first step that must be taken toward the destruction of an enemy is to find the enemy: so is it with tuberculosis.

Further, every case of tuberculosis, when found, must be classified from two points of view:

1. As to the stage of the disease, that is, whether in the first, second, or third stage.

2. As to the ability of the person to provide for himself and to surround himself with proper conditions, that is, whether fully or only partially able so to do, or whether wholly unable.

In the seventh or last piece of legislation suggested it was set forth that boards of health should be empowered to prescribe the rules with which tuberculous persons shall comply. No legislature, however favorably disposed, can provide by statute for all the varying conditions and circumstances that will arise in a war against tuberculosis; neither can county commissioners or municipal authorities so do; hence boards of health must be clothed with authority to meet these conditions and emergencies as they arise by rules that have the force and effect of law.

We now reach the discussion of the third and last one of the forces mentioned at the outset as indispensable in a warfare against tuberculosis, namely, money. It matters not how thorough education and how complete legislation may be, little will be accomplished toward the eradication of tuberculosis unless the price of redemption be paid in dollars and cents. Before proceeding to point out in a general way the purposes for which money is to be expended, let us pause a moment and contemplate the magnitude of the work to be achieved.

The proposition is to eradicate a disease that prevails in every clime and country, a disease common to both man and animal, a disease insidious in its approach and tenacious in its grasp, a disease that reaches more victims and over a greater number of routes and slays them more mercilessly than any other. Put the work involved in all of the greatest achievements of the past and that in the most stupendous enterprises of the present together, and they will shrink in magnitude far below the colossal proportions of the work that will be required for conducting a successful warfare against tuberculosis. Spasmodic and sporadic efforts will avail little; the war must be a world-wide, simultaneous, and coöperative one. It will not be a "thirty years' war," but a fifty years' war, yea, perhaps one hundred years from now our successors, if still fighting, may see "the last armed foe expire."

However stupendous the undertaking, the antituberculosis armies of the world should form an offensive alliance and press forward in the attack,

looking with prophetic eyes to the glorious day when the banner of science will proudly float over a vanquished foe.

From what sources shall "the sinews of war" be obtained? While private munificence may here and there do something for the cause, it is clear that the great burden of expense must fall on the governments. Not only so, in dealing with a disease so wide-spread and universal as tuberculosis each government must destroy the enemy in its own territory. So far as this government is concerned, each division must provide for its own tuberculous; one division need not wait for another to do its work. All should remember that were the disease entirely eradicated from a city, county, or State, such is the migration of population that reinfection would soon occur; indeed, freedom of any locality from infection would invite reinfection.

We are now prepared to summarize what may be done by the States, counties, and municipalities of this country for the eradication of tuberculosis. In addition to spreading a knowledge as to the causation and propagation of tuberculosis into every home and enacting all needed laws and ordinances, the following provisions are indispensable:

1. Each State must build, equip, and maintain at least one sanatorium for the treatment of incipient or curable cases of the disease. Such an institution should be intended more as an object-lesson and educational center for the counties and municipalities than for the purpose of providing for all of the curable cases in the State, as manifestly this would be impracticable.

2. Each county should provide two sanatoriums for its own people, one for incipient or curable cases, the other for advanced or incurable cases. In sparsely settled sections two or more counties might combine in establishing and maintaining the same sanatoriums.

3. Each city of 50,000 inhabitants or more should also provide two sanatoriums for its two classes of cases. Municipalities of less than 50,000 inhabitants might combine with the county in which they are situated in providing sanatoriums, the expense being pro-rated betwixt them. Such sanatoriums would be just as essential in a war against tuberculosis as military forts would be in a war against a foreign foe.

Proximity of sanatoriums to the people who need them is a condition worthy of the greatest consideration. The transfer of a victim of the disease, whether in the incipient or advanced stage, to a distant sanatorium would in many instances be attended by serious difficulties; a mother would refuse to give up son or daughter, and vice versâ; but if the sanatorium to which transfer is to be made be near by, this difficulty, which must be reckoned with, would be largely overcome.

Much can be accomplished everywhere by educating the people as to the methods of so providing for both incipient and advanced cases as to

surround the former with conditions favorable to recovery and the latter with conditions unfavorable to a further propagation of the disease. Simple and inexpensive accommodations for both of these classes of cases may be improvised, especially in rural districts, that people of even moderate means could well afford.

When every State, county, and municipality of the United States is equipped for the war on tuberculosis in the way briefly pointed out, and when the war is vigorously prosecuted in every one of them, and not until then may we expect conquests to be made in our country that can be verified by statistics. With corresponding facilities and warfare throughout the world, similar conquests may be expected everywhere. Then, and not till then, will victory be complete.

LA LOI ET L'INITIATIVE PRIVÉE CONTRE LA TUBERCULOSE.

PAR LE DR. BOUREILLE,
Paris.

Depuis bientôt vingt ans que la lutte contre la tuberculose est engagée dans le monde entier, les moyens les plus divers ont été préconisés pour triompher de ce fléau.

En vérité, aucun ne donna le résultat souhaité. La guerre au crachat n'a pas sensiblement diminué le nombre des cracheurs et encore moins celui des tuberculeux. Les résultats sérieux des divers sérums ne sont pas encore constatés, si ce n'est les aggravations produites par certains d'entre eux.

Les sanatoria ont guéri "économiquement" comme disent les Allemands, mais les rechutes fréquentes, les demi-guérisons, ont coûté trés cher pour transformer des moribonds en impotents. Les dispensaires eux-mêmes, sur lesquels furent fondées tant d'espérances, sont souvent demeurés de simples cliniques, magasins distributeurs de conseils mal écoutés, et de secours consommés en famille, léger palliatif à la misère des tuberculeux urbains. L'assainissement des villes n'aboutit la plupart du temps, qu'à la dénonciation des logements surpeuplés et insalubres, aux autorités impuissantes.

La lutte anti-tuberculeuse a cherché bien loin des armes nouvelles, elle a remué nombre d'enquêtes, connu beaucoup de misère, soulevé le voile sur les sanies que l'on voulait ignorer naguère, et s'en est tenue là.

Depuis vingt ans, on dirige une enquête sur la tuberculose et non pas une lutte anti-tuberculeuse.

Le sanatorium, le dispensaire, l'assainissement du logement, la guerre au crachat, la recherche du sérum sauveur ont fait le sujet d'études bien menées. très intéressantes, très académiques, surtout académiques.

Lutte sociale, lutte populaire, furent des mots sonores pour bercer les foules, mais ne traduisirent jamais une réalité.

Il en est de la lutte anti-tuberculeuse comme de certaines réformes, Tout le monde les reclame, mais quand il s'agit de construire, on trouve devant soi des difficultés tellement grandes, que force est de prendre du temps, et d'exécuter en des années, ce qu'on pensait faire tout de suite.

La lutte anti-tuberculeuse voit dressée devant elle une muraille très haute, inaccessible et infranchissable, semble-t-il. Contre elle se liguent les habitudes de mauvaise hygiène; les maisons de cinq à six étages, insalubres et surpeuplées, mais a valeur marchande très élevée; les intérêts patronaux dont l'ébranlement provoque des contre-coups dans le crédit d'une ville ou d'un Etat; la nourriture fraudée que l'on ne peut changer en un jour; les bas salaires que l'on n'élève pas, et les longues journées de travail que l'on ne diminue pas, sans provoquer des grèves dont la repercution est très étendue.

Ce faisceau d'intérêts particuliers et d habitudes mauvaises est tellement serré, et les parties en sont si solidaires, que toucher à l'une émeut la voisine.

De semblables réformes ne se font pas à coups de bons conseils ou de bonnes paroles, même pas à coups de lois solides, sévères, et appliquées rudement, elles exigent une transformation rationnelle et progressive des mœurs.

A Maladie Sociale Remède Social.

Sachons-le bien, la lutte anti-tuberculeuse est la lutte de l'intérêt général contre les intérêts particuleirs; la lutte de cinquante locataires d'un immeuble de six étages, contre leur propriétaire; la lutte de deux cents ouvriers d'une usine contre leur patron; la lutte de cent mille habitants d'une ville mal pavée, mal éclairée, mal nettoyée, contre leur municipalité; la lutte d'une partie de la nation miséreuse, mal nourrie et mal logée contre une autre partie du pays, plus heureuse; la lutte de ceux qui ne possèdent pas et ne dirigent pas, contre ceux qui possèdent et dirigent.

C'est l'éternelle révolte des esclaves contre Rome, c'est le mont Aventin dressé jusqu'à la fin des siècles, en face des inégalités et des injustices.

La lutte anti-tuberculeuse est donc une lutte sociale, mais seulement une phase de la lutte humaine. C'est pourquoi les moyens employés ont si peu d'action sur elle.

L'employeur, le propriétaire, qui cause sans le vouloir, assurément, quelquefois sans le savoir, la tuberculose de ses employés ou de ses locataires, a des intérêts respectables à ménager, des responsabilités considérables, des soucis qui l'empêchent souvent de voir les détails malsains de son atelier ou de sa maison. Cependant il peut être humain, désirer l'amélioration du sort de ses ouvriers, souhaiter en son for intérieur, un logement salubre pour ses locataires.

Mais quand l'heure des réalisations a sonné, force lui est bien d'avouer que s'il accorde telle amélioration, il abaisse ses revenus dans des proportions inquiétantes; que ce consentement entrainera celui de ses collègues propriétaires et patrons; qu'une part d'influence lui échappera et, que si l'intérêt de ses inférieurs exige ces satisfactions, son intérêt, à lui, demande de les refuser. Et l'intérêt particulier prime comme toujours l'intérêt général.

L'employé, le locataire, le dirigé, a aussi des intérêts respectables, des responsabilités considérables, des soucis qui l'empêchent de voir et de comprendre le raisonnement de l'employeur et du dirigeant. Il a une famille à sourrir, à payer un loyer toujours trop élevé pour sa pauvre bourse; chaque jour il lui faut besogner durement, pour manger le jour même; et souvent son horizon se borne au morceau de pain qu'il a sur sa table, et à la pièce de monnaie reçue la veille.

Pauvres salaires, pauvres logements, pauvres gens, tout leur est misère et peine, et point pour eux ne luit le ciel bleu.

Le besogneux pense lui aussi à son intérêt particulier. Il parle de solidarité humaine, mais ce n'est pas au nom de cette solidarité qu'il demande justice, c'est au nom de son intérêt personnel. Bien souvent, il n'hésite pas à ignorer ou à choquer l'intérêt du voisin quand le sien est en jeu.

Ainsi se trouvent en présence deux mondes, deux classes, qui ne s'entraident pas pour lutter contre la tuberculose, parce qu'ils ne se comprennent pas, et que la conversation est presque toujours impossible entre eux.

Et cependant, la solution du problème tuberculeux est facile. Donnez des logements salubres, à la place des taudis, créez un minimum de salaires, diminuez les heures de travail, mettez fin au scandale du travail féminin qui place la femme entre la misère et la prostitution, faites que le bien être soit mieux réparti. Tout cela est faisable immédiatetement; mais c'est la révolution probable. Beaucoup redouteront cette éventualité.

L'application des Lois luttera Victorieusement contre la Tuberculose.

Sans bouleverser quoi que ce soit, la rigoureuse et intégrale application des lois existantes, peut rendre des services éminents. Lois sur le travail, loi sur l'assistance médicale gratuite, loi sur l'assistance des vieillards, loi sur l'hospitalisation des indigents incurables, loi sur le repos hebdomadaire, loi sur les retraites ouvrières, loi sur les maisons à bon marché, loi pour la protection de la santé publique, loi sur l'ivresse publique: lois excellentes, lois sociales qui procurent déjà un mieux-être aux pauvres gens, et qui bien appliquées, lutteraient victorieusement contre la tuberculose.

Leur bon fonctionnement réduirait la misère, diminuerait le surmenage, donnerait plus d'air et de lumière aux logements et aux ateliers, procurerait un peu de repos aux travailleurs, assurerait une retraite et un logis à leurs vieux jours, réduirait cet autre danger, l'alcoolisme.

Tout ceci est possible: ne cherchons pas la suppression de la tuberculose dans la défense de cracher à terre, ou le sanatorium, ou tout autre moyen médical fut-ce un sérum; la médecine n'exterminera jamais la tuberculose. La panacée, c'est le bien-être, et ce bien-être est réalisable si la nation le

veut. La législation actuelle est une première étape dans cette lutte pour la vie. De son application immédiate, et de son perfectionnement, dépend le succès du combat engagé contre la tuberculose.

La Loi n'obtiendra des Victoires durables qu'avec l'aide de l'Initiative Privée.

Seule, la loi ne donnera pas de bons résultats parce qu'elle se présentera avec un cortége de sanctions, et que le public verra en elle le commandement et non la justice.

La loi doit être accompagnée d'institutions dues à l'initiative privée: ces institutions préparent le peuple à l'acceptation de la loi.

Les organisations privées qui ont pour but spécial la lutte anti-tuberculeuse ne donneront donc de résultats appréciables qu'autant qu'elles réaliseront les désirs du législateur et procureront un bien-être plus grand à l'individu.

L'œuvre anti-tuberculeuse sera d'abord une œuvre d'assistance et de préservation des prédisposés, car les menacés sont de beaucoup plus nombreux que les atteints; et seulement en second lieu, elle fera œuvre de guérison. Les ressources disponibles seront proportionnelles au nombre des individus manquant de bien-être, c'est-à-dire que la plus grande partie en sera attribuée à la préservation toujours certaine et la plus petite à la guérison si aléatoire.

Parmi les organisations anti-tuberculeuses existantes, celles qui sans conteste rentrent le mieux dans le cadre des œuvres de Préservation et d'Assistance, donnent l'aide la plus sérieuse au législateur, tendent le plus à augmenter le bien-être, et par là à diminuer la tuberculose, sont à coup sûr: le Dispensaire-Préventorium anti-tuberculeux, et les Colonies de vacances et Œuvres du grand air.

Première arme Préventive de l'Initiative Privée: Le Préventorium Anti-Tuberculeux.

Mais il faut bien s'entendre sur le Dispensaire anti-tuberculeux. Quand j'emploie ce mot: dispensaire-préventorium anti-tuberculeux, je n'ai en vue, ni les anciennes cliniques anti-tuberculeuses, qui ont simplement changé de nom; ni les dispensaires-sanatoriums, où les malades séjournent pendant le jour; ni les dispensaires de thérapeutique, qui traitent le malade dans son foyer d'infection; ni les dispensaires qui répondent seulement à des préoccupations politiques ou à des vues particulières. Le dispensaire-préventorium ne s'occupe pas de traiter, encore moins promet-il la guérison; il n'est pas outillé pour cela. Il se trouve en ville, au centre d'un foyer de tuberculose, c'est-à-dire à l'endroit de la ville, où l'air et le soleil manquent le plus,

où la misère est la plus grande, où le surmenage est le plus intense. Et son premier acte serait de maintenir des malades dans un tel milieu, en prétendant remédier avec des médicaments, à un état causé par la misère, le surpeuplement, l'insalubrité, le surmenage, l'alcoolisme!

Le dispensaire qui laisse de propos délibéré le tuberculeux dans le foyer d'infection où il vit, est une institution mauvaise et anti-sociale au premier chef.

C'est seulement quand il y a impossibilité absolue d'éloigner un tuberculeux de la zone dangereuse où il vit, qu'il est permis au dispensaire de l'y assister médicalement; mais c'est là un pis-aller, et le nombre des malades justiciables de cette mesure d'humanité, est toujours très restreint.

J'entends par Dispensaire-Préventorium Anti-Tuberculeux, un centre d'action anti-tuberculeuse animé d'un esprit vraiment moderne. Il recherchera, découvrira les malades; établira l'étendue des foyers d'infection, et notera leurs causes véritables, presque toujours contraires aux lois. Puis il exigera l'assainissement des foyers découverts.

Ce dispensaire n'a pas mission d'appliquer les lois—c'est l'affaire de la force publique—mais de signaler à qui de droit, tel foyer de tuberculose causé par la non exécution des lois. Ce préventorium doit en outre parer aux premières nécessités, soulager tout de suite les misères trop grandes; procurer immediatement un logement salubre; envoyer rapidement à la campagne les enfants les plus menacés; diriger aussitôt vers le sanatorium ou la cure libre, le malade curable que rien n'attache à la ville.

En un mot le dispensaire-préventorium dépiste et étudie le foyer tuberculeux, assiste tout de suite les cas urgents, signale les causes illégales de tuberculose, et préserve les non atteints. Le dispensaire-préventorium est un bureau d'enquête et de préservation anti-tuberculeuse, auxiliaire indispensable de l'autorité chargée de veiller à la santé publique.

Tel est le rôle paralégal et de première urgence, si j'ose dire, du Préventorium anti-tuberculeux moderne. C'est en somme à peu de chose près, le rôle du premier dispensaire-préventorium créé par Calmette, à Lille; mais si étendue qu'en soit l'action, elle peut être portée encore plus loin, car la prévention anti-tuberculeuse ne doit laisser dans l'ombre aucun moyen d'adoucir le sort des deshérités.

Certaines améliorations ne sont pas d'urgence absolue, ne relèvent pas de la loi, et n'en demeurent pas moins très désirables.

Le Préventorium doit utiliser toutes les formes actuelles de l'Assistance et de l'Hygiène sociales.

Ainsi, le Bain-Douche offre la propreté aux travailleurs pour un prix infime. La Goutte de Lait procure du lait pur aux enfants. Le Restaurant Economique donne une nourriture saine et peu chère aux célibataires et aux ouvriers qui travaillent loin de leur domicile; il est complété par une coopéra-

tive de consommation, où les familles pourront acheter des produits alimentaires à prix réduits.

Le Préventorium réclame une colonie de vacances pour envoyer à la campagne, ou à la mer, plusieurs mois par an, les enfants sains des tuberculeux ses clients. L'action de cette colonie de vacances est continuée sur un terrain de jeux extra-urbain, en plein air, où les enfants se rendent le plus souvent possible.

Le Préventorium demande enfin des maisons à bon marché, où les menacés, les guéris, et ceux qui ne peuvent quitter la ville, trouvent pour une somme modeste, un logement salubre.

La cure libre que le Préventorium choisit pour ses malades non contagieux, est simplement la campagne au pays natal. Le médecin de famille prodigue les soins nécessaires. La moitié du voyage est payée par la Compagnie de chemin de fer. L'autre moitié et les honoraires du médecin, sont à la charge de l'Œuvre. La famille loge gratuitement le malade, et lui assure l'assistance alimentaire en partie tout au moins. S'il est nécessaire, la Commune et le Préventorium aideront la famille. Le Sanatorium et l'hôpital recoivent selon leur degré de maladie, les tuberculeux contagieux que ne peut accepter la cure libre.

Le Préventorium créera, si ses resources le lui permettent, ces diverses organisations. La plupart du temps son trop modique budget l'en empêche. Il devra faire alliance avec les œuvres qui peuvent l'aider dans son action anti-tuberculeuse.

Que le Préventorium ait ou non sous sa dépendance immédiate, une Goutte de Lait, une cure libre, une colonie de vacances, un terrain de jeux, une maison à bon marché, un restaurant économique, une coopérative de consommation, un bain-douche, cela n'a pas d'importance. Le principal est que par l'intermédiaire du Préventorium, les habitants du foyer tuberculeux puissent jouir de tous les moyens préventifs et curatifs que la science moderne met à leur disposition.

Seconde arme Préventive de l'Initiative Privée: Les Œuvres du Grand Air.

Les Colonies de Vacances et œuvres du Grand Air ne sont pas de simples auxiliaires du Préventorium. Elles teinnent une place considérable dans l'armement anti-tuberculeux. Leur action combinée avec celle d'un Préventorium, même modeste, donne des résultats de la plus haute importance, dans la préservation anti-tuberculeuse.

Les Colonies de Vacances et œuvres du Grand Air demandent ainsi que le Préventorium à être mises au point.

Par envoi au grand air, il ne faut pas comprendre ces départs hatifs d'enfants des villes à la mer ou à la campagne avec retour le jour même ou le

lendemain, voire au bout de trois ou quatre jours, départs si fréquents au moment des fêtes et des grandes vacances.

Les trains de plaisir et les trop courts séjours ne donnent pas de repos, bien au contraire, aux prédisposés à la tuberculose. Ne sont pas de véritables œuvres du grand air, les colonies de vacances où les directeurs placent la conquête de l'esprit des enfants avant l'amélioration de leur corps. Ne meritent pas le titre de colonies de vacances, les œuvres qui conduisent les enfants militairement, leur font faire de longues courses, développent à outrance les exercises physiques, et tiennent plus de la société de gymnastique que de l'œuvre du grand air. Ne rentrent pas dans notre catégorie, les colonies qui prennent au hasard les enfants pauvres, et risquent de laisser dans le foyer dangereux urbain, les prédisposés à la tuberculose, alors qu'elles dirigent vers la campagne ou la mer, des enfants vivant dans un excellent milieu, pour qui ce voyage sera un luxe et non une nécessité.

La vraie colonie de vacances choisit les enfants à préserver parmi les fils et filles sains de tuberculeux, les anémiques, les convalescents de maladies graves, les mal logés les mal nourris, en un mot les prédisposés à la tuberculose.

La colonie idéale préfère les enfants faibles, derniers de leur classe, aux enfants vigoureux toujours en tête de leurs camarades.

Pour l'admission des enfants, cette colonie se fie à l'avis du médecin examinateur, et non à la recommandation de telle personne influente ou charitable.

Les enfants à qui l'air pur est le plus nécessaire, et qui peuvent le trouver le moins difficilement avec leurs propres moyens, sont examinés au départ et au retour. D'après l'avis médical ils seront envoyés à la mer, à la campagne, ou à la montagne et non en bloc ici ou là, selon les ressources de l'œuvre.

Quand l'œuvre dispose d'un faible budget, elle choisit sa colonie à la campagne qui n'est dangereuse pour aucun enfant.

D'autres questions préoccuperont les Directeurs d'œuvres du Grand Air: la surveillance des enfants, leur mode de placement en internat ou familial, etc. Le soin de ces détails est laissé à l'initiative de chacun. Le caractère de l'œuvre n'a en effet aucun intérêt en soi, pourvu que de but principal soit l'amélioration physique des enfants.

Ce qui importe, est le recrutement et l'examen des enfants, questions d'ordre absolument médical, sans lesquels les colonies de vacances deviennent de simples promenades, où la santé de l'enfant passe au second plan.

Telle est la façon d'entendre la colonie de vacances, œuvre du grand air.

Le Bien-Être guérit la Tuberculose.

Le Préventorium moderne d'une action si étendue, et la cure d'air préventive pour l'enfance menacée, donneront des résultats merveilleux, le

jour où l'on sera décidé à en tenter l'expérience sur une population importante.

Aides de ces deux organisations créés par l'initiative privée, les pouvoirs publics peuvent, s'ils veulent bien tenir la main à l'exécution des lois d'Assistance, d'Hygiène et de Travail, diminuer la tuberculose d'une façon notable en peu d'années.

Cela est si vrai que des résultats convenables ont été obtenus avec des Dispensaires-Préventoriums et des Colonies de Vacances créés hâtivement, sans ressources suffisantes, ne réalisant que partie de leur programme, et limitant malgré eux l'action préventive.

Et cependant des victoires importantes, restent à l'actif de ces organisations anti-tuberculeuses incomplètes.

Certains foyers tuberculeux ont rétrogradé, d'autres ne se sont plus développés et des enfants fortement prédisposés, anémiques, sont maintenant de solides gaillards pleins de santé et de vie; des salaires furent regagnés, du travail a pu être accompli par ces malades guéris maintenant, des logements propres et salubres remplacent les taudis où ils contractèrent la tuberculose: le mal n'a pas atteint ceux qu'il guettait, des vies humaines ont été conservées.

N'est-ce pas là un fait social d'une très haute portée?

Et puisqu'on éprouve tant de difficultés à attaquer de front le fléau tuberculeux, à démolir les maisons insalubres, à aérer les ateliers, à augmenter les salaires, à diminuer les heures de travail, à transformer rapidement les habitudes; puisqu'il est fou de songer à une victoire absolue, et que la Cité de l'Avenir où tout sera "joie et santé" est encore si lointaine, pourquoi ne pas realiser tout de suite, ce qui est possible?

Les lois existantes, aidées du Préventorium Anti-Tuberculeux, et des colonies de Grand Air, formeront la première étape vers le Bien-Être qui seul guérira l'Humanité de la Tuberculose.

THE PREVENTION OF TUBERCULOSIS.

By J. L. Medina, M.D.,
New York.

The medical profession, after years and years of constant and conscientious work, combating against the ignorant and reactionary elements of society, seems to have succeeded in awakening the civilized world to realize and appreciate the most dangerous situation in which the human race stands to-day, due to the constant increase, and inevitable fatal termination, of all cases of pulmonary tuberculosis.

When a meeting like this is on account of a certain epidemic prevailing in a certain locality or country, the interest on the subject is also localized; but in the present instance the whole world, and individually every human being, is anxiously waiting some word of encouragement, indicating the way of avoiding, or at least of diminishing, the great death-rate from tuberculosis as it unfortunately stands to-day.

A little more than twenty-five years have passed since the tubercle bacillus was discovered by our eminent guest, Prof. Robert Koch, to whom the whole world owes a great debt, and his name will go to posterity linked with those of the great benefactors of humanity. His discovery has been of inestimable value to the profession, giving the foundation or the starting-point for all kinds of experiments, in the hope of finding the successful treatment of the disease.

The etiology of tuberculosis was not clearly understood at that time, but since the discovery of the bacillus the exact scientific explanation of the pathological changes was easily comprehended. With the right understanding of the causes of the disease, a new impetus and great stimulation were given to research, and great hopes filled the hearts of the profession, with certain degree of assurance that in a short time a way would be found to check the progress of this most dreadful enemy of mankind.

Great praise is due to the bacteriologists for all that they have accomplished already for the good of humanity, and what we may expect in the future from these scientific wizards can only approximately be surmised.

But the expectations of the profession and the public from the bacteriological laboratories in this particular instance have been not only exaggerated and unreasonable, but to a certain extent inconsistent with the knowledge we have of the disease.

For a quarter of a century the whole world has expected to wake up one day to find a certain preparation, a drug, a toxin, a lymph, or something like it, which will surely cure pulmonary tuberculosis in every stage of the disease. To expect this is to expect a physical impossibility. This is not a case of a membranous exudation, as in diphtheria.

During the later period of the first, second, and third stages of pulmonary tuberculosis the lung tissue undergoes such pathological changes that the organ does not exist any longer as originally, and whatever is left intact will surely follow its inevitable process of disintegration. This inconsistent expectation has been the cause of bitter disappointment to the public, doubting the efficiency of the medical profession for not finding that expected panacea that they have heard and dreamed about, but that has not, and will not, materialize.

Before going any further I will state that I wish to be rightly understood, and beg that the following remarks under no consideration should be construed as a criticism of any one, or of any of the different methods of treatment advocated to date. Personally, I have the greatest regard for every enthusiast on the subject of treating tuberculosis, and I have been for years one of them, during my connection with hospitals and dispensaries in the city of New York. I fully appreciate the vast amount of good that all hospitals, sanatoriums, dispensaries, and boards of health are doing for our unfortunate fellow-creatures who are doomed to destruction, my object being only to present an impartial study of the real and true existing conditions, as far as practical results are concerned, in checking the spread of the disease or reducing the mortality.

I will not quote here the personal experience of any one, nor reach any conclusion based on guesswork, and will take as a standard the official statistics published by the Board of Health of the city of New York.

We must bear in mind that it is quite impossible for any board of health to obtain accurate records, especially about this particular disease. In private practice cases of tuberculosis are seldom reported, for obvious reasons: A great number of patients absolutely refuse to consult a physician if they suspect themselves to be afflicted with the disease; others patronize only the so-called "institutes" of the sure-cure style, managed by irregular physicians. The certificate of death frequently omits the words "phthisis pulmonalis" as the primary cause of death to suit the wishes of the family, for personal or financial reasons, and so the only source of reliable information comes from the public institutions.

The total number of deaths from all causes, as recorded in this pamphlet by the Board of Health of New York, is as follows:

Isle of Manhattan, from 1887 to 1897, with an average population of one to one and a half million inhabitants, total number of deaths from all causes	457,458
Total number of deaths from all kinds of tuberculosis during the same period	60,576
From 1897 to 1907, with an increase in the population of half a million inhabitants, the total number of deaths from all causes was	438,034
During the same period the number of deaths from tuberculosis was	62,296
During last year, 1907, the total number of deaths from all causes was	47,698
From tuberculosis	6,809
Including what is called greater New York, with 4,000,000 inhabitants, during 1907 the number of deaths from all causes was	79,215
During the same year, 1907, from tuberculosis	10,262
Number of cases reported during 1897	9,735
During 1907	24,363

From the study of the previous statistical figures we are forced to reach the conclusions:

1. That during the last ten years, with an increase of about half a million over the number of inhabitants of the previous ten years, still the total number of deaths from all causes did not increase proportionally, but instead diminished by 19,424.

2. That during the same ten years the number of deaths from tuberculosis does not show the same diminution, nor remains as in the previous ten years, but actually shows a numerical increase of 1720.

3. That the diminution in the general death-rate no doubt is due to the better understanding of the hygienic rules, the higher standard of education of the people, and in no less degree to the efficient boards of health. Incidentally, I may state right here, as a matter of justice, that too much praise cannot be given to the Board of Health of the city of New York for the masterful way in which they manage their department. It would be worth while and profitable to other cities to study the most up-to-date methods employed by that institution.

4. That with all the present advanced methods and the great amount of work done to better conditions as far as curing or checking the spread of tuberculosis, our efforts have been palpably insufficient.

Our inability to arrest the constant spread or diminish the mortality from tuberculosis plainly shows that we have not started in the right direction. To my mind, the only rational and effective treatment for pulmonary tu-

berculosis to-day is the preventive treatment. It will be a comparatively easy matter to accomplish this if we only accept the principle; science, money, and brain ingenuity will do the rest.

The prevention of tuberculosis will have to be declared a national issue. Unless the Federal Government of this mighty nation takes the lead in the campaign, the individual efforts will be lost and ineffective. The national Congress ought to vote an annual sum for the establishment and maintenance of a permanent national board of health, to direct the others, to help, instruct, and coöperate to destroy the greatest enemy of the human race.

If the national government should place tuberculosis in the same category as yellow fever, smallpox, and bubonic plague, it would not take very long to notice the improvement. If an epidemic of yellow fever appears somewhere, every branch of the government is put at once in action, and, regardless of cost or work, the epidemic is checked, may be with a loss of a few hundred cases in so many years; while with tuberculosis we have become so familiarized that we see every year in this country 150,000 able citizens march to the unknown, to join the millions and millions already gone, and simply satisfy ourselves with not being included in the line of march so far.

Immigrants suffering from pulmonary tuberculosis ought not to be admitted to this or any other country. Immigrants are required to have a few dollars in their pockets on arrival in this country; it would be far wiser to admit them without a cent, so long as they are free from tuberculosis. There is enough tuberculosis here already.

The State authorities ought to coöperate in an effective manner, helping in a practical way to secure adequate legislation for the municipalities. Boards of health, no matter how efficient, cannot be expected alone to attain complete success in their difficult undertaking; the magnitude of the charge is such that it will require the personal, financial, and influential coöperation of the whole community.

There should be established permanent national, State, and city committees, the last to be subdivided into district committees, to visit, canvass, instruct, report, and follow or locate all cases of tuberculosis coming in that section. The district committees should endeavor to enlist the services of volunteers, with authority to arrest offenders for spitting on the floors of vehicles of all kinds, sidewalks, theaters, churches, etc.

Compulsory obligation on the part of the attending physician to report to the health authorities every case of tuberculosis coming under his professional care is of the greatest importance. This procedure has worked admirably in New York with diphtheria, typhoid fever, smallpox, and others, but tuberculosis was not included in the list, I think, until lately.

I said before that the only rational and effective treatment for tuberculosis is the preventive treatment; but how is this prevention to be accomplished? Simply by the constant, persistent, systematic, and compulsory education of the public.

By education of the public I do not mean that painful attempt usually made in the hope of instructing the far-advanced consumptive—Oh, no! The education of that man or woman was neglected long ago, and now is too late; besides, the consumptive usually bears some spite toward the rest of society, and is persistently reactionary to prophylactic measures.

The education, to be effective, must begin in the school-rooms. The instructions received at the school practically instruct the unborn, and certainly we could not begin earlier. Just think for a moment of the hundreds and hundreds of thousands of boys and girls leaving the schools every year; these boys and girls will represent in the future hundreds and hundreds of thousands of families practising prophylactic measures themselves, and teaching the same principles to their future generation.

Every applicant for admission to a public school ought to have a thorough physical examination before being admitted; this examination to be conducted by the official physician appointed for that purpose by the respective board of health; in case of doubt in the diagnosis, the sputum to be examined microscopically. Children with tuberculosis ought not to be admitted to a public school.

Children receiving public instruction from the institutions provided by the municipalities ought to be under the surveillance of the local committees, to be reasonably sure that their way of living is up to the required standard of cleanliness, and that the other measures conducive to the prevention of tuberculosis are observed.

Elementary hygiene ought to be included in the program of studies in the public schools. Children in public schools ought to have a certain number of lectures on tuberculosis, and the ways to avoid infection, using plain language and objective methods, exhibiting specimens, etc., to be easily understood by the young pupils. Prizes might be distributed to the pupils best posted on the subject, and other minute points can be brought out for the perfection of the method that I have roughly outlined.

There are a thousand other ways to reach and instruct the public. In New York, for example, a series of lectures are given every year by the Board of Education in the auditorium of the public-school buildings. These lectures deal with different subjects, principally history, and usually are illustrated with stereopticon views. To these lectures a few more could be added, dealing in hygiene, with special reference to the prevention of tuberculosis. The services of the public press ought to be solicited, and stimulated to work constantly, and not spasmodically, as they do now, keeping before

the public a systematic way of instruction, making known constantly the true condition of affairs, showing clearly and concisely the way to avoid contracting the disease. The form of advertisements is very attractive to the public.

If during the last twenty-five years we had devoted more time and energy to the prevention of tuberculosis, instead of depending nearly entirely on the momentarily expected curative treatment, the present condition would be a great deal more satisfactory. Still, it is never too late to begin; and I feel sure that we have no reason to lose courage, but, on the contrary, full of determination, let us go ahead in the right direction, and in much less than a quarter of a century pulmonary tuberculosis will have come to the same level as the other benign diseases.

PLAN GENERAL DE CASAS SANITARIAS Y HOGAR AMUEBLADO PARA LOS POBRES Ó CLASE TRABAJADORA DE LOS TROPICOS, EN INTERÉS DE LA CRUZADA CONTRA LA TUBERCULOSIS.

Por el Jose F. Toraya,
Arquitecto.

El escritor somete á la consideracion del Congreso un plan y modelo de una cuadra de edificios perfectamente sanitarios, á propósito para los trópcos. Cada casa y sada cuarto está arreglado de modo que tengan luz y aire, y no hay cuarto que no tenga á lo menos dos ventanas al exterior.

El plan indica el método de construcción y el gasto y señala la inspección que debe ejercer el Gobierno ó la municipalidad para su protección.

También se presenta un croquis modelo de las casas que muestra la disposición interior de cada cuarto, arreglo de las camsa, el trabajo sanitario y la cocina.

Plan général de maisons sanitaires ou d'une maison meublée pour la classe pauvre ou ouvrière dans les pays tropicaux.—(Toraya.)

L'auteur présente pour la considération du Congrès un plan et des modèles d'un bloc d'habitations parfaitement sanitaires et adaptées aux régions tropicales. Chaque maison et chaque pièce arrangée pour avoir de l'air et de la lumière, et aucune pièce n'a moins de deux fenêtres extérieures. Le plan présente la méthode de construction et le coût, et signale la surveillance que devrait exercer le gouvernement ou la muncipialité en ce qui concerne la protection et l'inspection.

Un modèle des maisons est aussi présenté, démontrant la disposition intérieure des pièces, le placement des lits, les arrangements sanitaires et la cuisine.

General-Plan von gesunden Häusern und einem eingerichteten Heim für die arme oder arbeitende Classe in den Tropen.—(Toraya.)

Der Autor unterbreitet der Erwägung des Congresses einen Plan und Modelle eines vollständig gesundheitsgemässen Gebäudeblocks, der sich für die Tropen eignet.

Jedes Haus und jedes Zimmer ist arrangirt mit einem Ausblick auf Licht und Luft, und kein Zimmer hat weniger als zwei Aussenfenster.

Der Plan zeigt die Methoden der Construction, die Ausgaben und Fingerzeige in Bezug auf die Controlle, die durch die Regierung oder Stadtverwaltung beim Schutze und der Inspection ausgeübt werden sollte.

Ein schematisches Modell der Häuser ist ebenfalls vorgelegt, welches die innere Anordnung jedes Zimmers zeigt, und die Aufstellung von Betten, zusammen mit gesundheitlicher und Küchenarbeit.

General Plan of Sanitary Houses and a Furnished Home for the Poor or Working Class in the Tropics.—(TORAYA.)

The writer submits to the consideration of the Congress a plan and models of a perfectly sanitary block of buildings suitable for the tropics. Each house and each room is arranged with a view to light and air, and no room has less than two outside windows.

The plan shows the method of construction and the expense, and points out the control that should be exercised by the government or municipality in the protection and inspection.

A schematic model of the houses is also presented, showing interior disposition of rooms and arrangement of beds, together with sanitary work and kitchen.

After expressing his hearty appreciation of the manifest spirit and interest of those who participated in the work of Section VI, saying some words of special gratitude to those who came from other countries, and hoping that succeeding Congresses might bring all present together again with constantly increasing profit and good-will, General Wyman declared the Section adjourned.

U.S.

P
Med
T

International Congress on Tuberculosis.
6th, Washington, 1908

Transactions

of the

Sixth International Congress on Tuberculosis.

WASHINGTON, SEPTEMBER 28 TO OCTOBER 5, 1908.

WITH AN ACCOUNT AND CATALOGUE OF THE TUBERCULOSIS EXHIBITION,

WASHINGTON, SEPTEMBER 21 TO OCTOBER 12, 1908.

In Six Volumes.

VOLUME FOUR, PART TWO.

PROCEEDINGS OF SECTION VII,

Tuberculosis in Animals and Its Relations to Man.

413017
14.6.43

Philadelphia:
WILLIAM F. FELL COMPANY
1908.

Officers of Section VII.

President:

Dr. LEONARD PEARSON.

Honorary Presidents:

Prof. S. ARLOING, Lyon, France,
Prof. B. BANG, Copenhagen, Denmark,
Prof. J. F. HEYMANS, Ghent, Belgium,
Prof. F. HUTYRA, Budapest, Hungary,
Prof. J. MCFAYDEAN, London, England,
Prof. R. OSTERTAG, Berlin, Germany,
Dr. J. B. PIOT (BEY), Cairo, Egypt,
Dr. J. G. RUTHERFORD, Ottawa, Canada,
Prof. A. A. WLADIMIROFF, St. Petersburg, Russia.

Vice-Presidents:

Dr. LANGDON FROTHINGHAM,
Dr. JOSEPH HUGHES,
Dr. MARION DORSET,
Dr. B. MEADE BOLTON,
Dr. JAMES LAW,
Dr. A. D. MELVIN,
Dr. VERANUS MOORE,
Dr. A. PETERS,
Dr. M. P. RAVENEL,
Prof. H. L. RUSSELL,
Dr. D. E. SALMON,
Dr. E. C. SCHROEDER,
Dr. THEOBALD SMITH,
Dr. C. W. STILES,
Dr. A. R. WARD.

Secretary:

Dr. JOHN R. MOHLER.

SECTION VII.

Tuberculosis in Animals and Its Relations to Man.

FIRST SESSION.

Tuesday Morning, September 29, 1908, in the New National Museum.

THE PREVALENCE AND ECONOMICS OF TUBERCULOSIS IN ANIMALS.

Section VII was called to order on Tuesday, September 29, 1908, by the President, Dr. Leonard Pearson. Honorary Presidents of Section VII were elected, as follows:

Prof. S. Arloing, Lyons, France.
Dr. J. B. Piot Bey, Cairo, Egypt.
Prof. B. Bang, Copenhagen, Denmark.
Prof. J. F. Heymans, Ghent, Belgium.
Dr. J. G. Rutherford, Ottawa, Canada.
Prof. A. A. Wladimiroff, St. Petersburg, Russia.
Prof. Franz Hutyra, Budapest, Austria.
Prof. John MacFadyean, London, England.
Prof. Robert Ostertag, Berlin, Germany.

THE ECONOMIC IMPORTANCE OF TUBERCULOSIS OF FOOD-PRODUCING ANIMALS.

By A. D. Melvin, D.V.S.,

Chief of the United States Bureau of Animal Industry, Washington, D. C.

It is the purpose of this paper to call attention briefly to the serious injury which tuberculosis causes to the live-stock industry from the economic standpoint, and to suggest means of overcoming it, discussing the subject

as it affects the United States. Regardless of the question of the communicability of tuberculosis from animals to man and the bearing of animal tuberculosis on the public health, it is a well-known fact that this disease causes heavy financial loss to the live-stock industry; and while the saving of human life affords the highest motive for combating tuberculosis, the prevention of financial loss is alone a sufficient reason for undertaking the eradication of the disease from our farm animals.

The movement in the last few years for a more wholesome food-supply has resulted in drawing attention to the part played by tuberculosis as regards both health and economics. It must be realized that the exclusion of tuberculous meat and dairy products from the food-supply means a reduction in the quantity of available food, with a corresponding tendency to an increase in the cost of necessaries of life. The economic problem therefore concerns not only the stock-raiser and the producer, but the consumer, which means practically everybody. No nation is so wealthy that it can afford to sacrifice year after year a considerable and increasing proportion of its food-supply, especially when by proper means the loss can be reduced, and in time prevented entirely. This is a problem which must be faced eventually; and the earlier this is understood, the more easily it can be solved.

The Prevalence of Animal Tuberculosis.—While tuberculosis among animals is less prevalent in the United States than in some other countries, it has progressed to an alarming extent even in this country, and is undoubtedly on the increase, especially in States where no adequate measures have been taken against it. The animals principally affected are cattle and hogs. The disease readily spreads among cattle that come in close contact with each other, as in dairy herds, and experiments by the Bureau of Animal Industry have shown that it is easily communicated from cattle to hogs by the common practices of giving skim milk to hogs and allowing them to feed on the excrement of cattle. The increase of tuberculosis among hogs in the United States has been very marked in recent years. Sheep and goats are rarely affected, probably because of a natural tendency toward immunity, or because they are not generally exposed to infection.

The two principal sources of data as to the prevalence of tuberculosis among live-stock are (1) meat-inspection statistics and (2) records of the tuberculin test. Meat inspection throws light on the disease in cattle, hogs, sheep, and goats, while the information derived from the tuberculin test is practically confined to cattle.

Meat-inspection Statistics.—The Federal meat inspection, as extended under the law of June 30, 1906, now covers more than half of all the animals slaughtered for food in the United States, and the proportion of animals found affected with tuberculosis under this inspection service affords a basis

for forming some idea of the extent to which the disease exists among the meat animals of the country.

The following table shows the number of animals of each kind slaughtered under government inspection during the fiscal year ending June 30, 1908, and the number and percentage found affected with tuberculosis:

ANIMALS SLAUGHTERED UNDER FEDERAL INSPECTION IN THE UNITED STATES, WITH NUMBER AND PERCENTAGE FOUND TUBERCULOUS, DURING FISCAL YEAR 1908.

Kind	Number Slaughtered	Number Tuberculous	Percentage Tuberculous
Cattle	7,116,275	68,395	0.961
Calves	1,995,487	524	0.026
Hogs	35,113,077	719,309	2.049
Sheep	9,702,545	40	0.000
Goats	45,953	1	0.000
Total	53,973,337	788,269	1.460

Even a larger proportion of the animals slaughtered at establishments without Federal inspection are tuberculous, as one effect of a rigid inspection is to cause the establishments under inspection to exercise care in buying animals so as to minimize condemnations, while suspicious-looking animals are naturally diverted to the small local abattoirs that have no inspection. This was demonstrated by comparing results at establishments soon after they were placed under inspection by the new law with those at establishments where inspection had been in force for a long time, relatively twice as many cattle being condemned for tuberculosis at the former as at the latter places.

Taking these facts into consideration, it seems likely that more than 1 per cent. of the beef cattle in the United States are affected with tuberculosis to some degree, while over 2 per cent. of the hogs slaughtered are affected.

The Tuberculin Test.—It is known that dairy cattle are more generally affected than beef cattle, as the tuberculin test has shown that from 5 to 25 per cent. of the cows supplying milk to certain cities were tuberculous. For instance, tests made in 1907 on a large proportion of the herds supplying milk to the city of Washington showed about 17 per cent. of the cattle reacting.

For fifteen years the Bureau of Animal Industry has been preparing tuberculin and supplying it to State and city authorities for official use, besides using it in tests by its own employees. Recently the reports of tests

made with this tuberculin during this period have been carefully analyzed and tabulated. Out of 400,000 cattle tested, there were 37,000 reactions, or 9.25 per cent.

The majority of the cattle tested were dairy cattle, and the tests were made under various conditions. By far the larger proportion of the tests were made on cattle that had been within a State for a year or more. In some cases tests were made compulsorily on all cows supplying milk to a city; in other cases they were made when requested by owners, and in still others when the presence of tuberculosis was suspected in certain herds. It is impossible to determine accurately the weight of all these factors; but considering the fact that while dairy cattle largely predominate, their average is reduced by a certain proportion of other cattle, and offsetting against this the fact that the testing of herds under suspicion tends to raise the average somewhat, it seems reasonable to conclude from these tests that probably 10 per cent. of the dairy cattle in the country are affected with tuberculosis.

A remarkable feature of the reports referred to is the manner in which the diagnosis by the tuberculin test was confirmed by post-mortem examination on reacting animals that were slaughtered. Out of 24,784 reacting animals slaughtered, lesions of tuberculosis were found in 24,387—a percentage of 98.39. The Bureau has positive knowledge that in at least one State the testing was not done in a careful and reliable manner. If we discard the returns from this State, the proportion of cases in which the tuberculin reaction was confirmed by post-mortem is raised to 98.81 per cent. It is possible, too, that in some of the negative cases tuberculosis was really present, but the lesions were so slight as to escape detection on post-mortem examination by ordinary methods. Surely these figures, representing the work of scores of individuals in all parts of the United States over a period of fifteen years, bear strong testimony to the marvelous accuracy of the tuberculin test. Further evidence on this point is afforded by the slaughter, during the past year or two, in or near the city of Washington, of 126 cattle which had reacted to the test when applied by Bureau veterinarians, with only one failure to find lesions of tuberculosis on post-mortem examination, the percentage of accuracy being 99.21.

Properly prepared tuberculin applied by competent persons is thus shown to be a wonderfully reliable agent for diagnosing tuberculosis. In cases where the test appears to give unsatisfactory results this is usually due to the use of a poor quality of tuberculin or to ignorance or carelessness in applying it.

The following table shows the result of the tests above referred to, arranged according to States:

RESULTS OF TUBERCULIN TESTS OF CATTLE BY STATE AND FEDERAL OFFICERS WITH TUBERCULIN PREPARED BY THE BUREAU OF ANIMAL INDUSTRY, 1893, TO JULY 31, 1908, INCLUSIVE.

States.	Number of Cattle tested.	Number Reacting.	Percentage Reacting.	Number of Reactors Slaughtered.	Number found Tuberculous on Post-mortem.	Percentage found Tuberculous on Post-mortem.
Alabama	20					
Arizona	49	16	32.65	16	16	100.00
California	9,618	1,112	11.56	872	872	100.00
Colorado	822	50	6.08	14	13	92.86
Connecticut	6,080	852	14.01	750	748	99.73
Delaware	7	..	..	..	..	..
District of Columbia	8	7	87.50	5	5	100.00
Florida	1	..	..	..	..	..
Georgia	49	19	38.78	..	..	..
Idaho	10	..	..	..	..	..
Illinois	7,120	790	11.09	619	597	96.45
Indiana	2,935	246	8.38	129	127	98.45
Iowa	4,020	778	19.35	239	220	92.05
Kansas	120	4	3.33	4	3	75.00
Kentucky	327	37	11.31	13	12	92.31
Maine	3,264	149	4.56	116	109	93.97
Maryland	58	8	13.79	6	6	100.00
Massachusetts	86,223	11,853	13.75	10,760	10,688	99.34
Michigan	2,155	351	16.29	97	95	97.94
Minnesota	60,733	3,031	4.99	172	135	78.49
Mississippi	133	9	6.77	..	..	..
Missouri	1,680	133	7.92	4	4	100.00
Montana	62	25	40.33	2	1	50.00
Nebraska	105	49	46.67	18	18	100.00
New Hampshire	164	20	12.18	19	19	100.00
New Jersey	3,293	828	25.14	584	579	99.15
New Mexico	196	1	.51	1	1	100.00
New York	4,034	565	14.00	533	532	99.81
North Carolina	1,207	208	17.23	43	28	65.12
North Dakota	702	130	18.52	13	13	100.00
Ohio	2,933	425	14.49	69	68	98.55
Oklahoma	385	4	1.04	2	2	100.00
Oregon	1,466	351	23.94	274	266	97.05
Pennsylvania	90	25	27.77	7	7	100.00
Rhode Island	653	125	19.14	104	104	100.00
South Carolina	395	40	10.12	1	1	100.00
Tennessee	88	7	7.95	..	..	..
Texas	76	..	..	..	..	..
Utah	120	21	17.50	12	12	100.00
Vermont	162,570	10,628	6.54	8,248	8,166	99.00
Virginia	899	158	17.58	101	98	97.03
Washington	2,779	455	16.37	10	8	80.00
West Virginia	60	13	21.67	12	12	100.00
Wisconsin	32,297	3,477	10.77	915	802	87.65
Wyoming	2	..	..	..	..	..
Total	400,008	37,000	9.25	24,784	24,387	98.39

In this compilation the following basis has been adopted in determining what constitutes a reaction, as in the experience of the Bureau of Animal Industry this method has been found to give reliable results: A reaction consists of a rise of 2° F. or more above the highest temperature before injection, provided the maximum temperature after injection reaches 103.8° F.

It should also be explained that the number of tests shown in the table represents only those of which the Bureau received reports, and not the entire number of doses of tuberculin prepared and distributed by the Bureau during the period named.

Assuming that 10 per cent. represents the prevalence of tuberculosis among dairy cattle as indicated by tuberculin tests, and 1 per cent. among cattle slaughtered for beef as shown by the meat-inspection figures, and taking 21,194,000 as the number of milch-cows and 50,073,000 as the number of other cattle in the United States on January 1, 1908, as estimated by the Bureau of Statistics of the Department of Agriculture, we conclude that as a general average about 3.5 per cent. of the cattle of this country are affected with tuberculosis.

Economic Losses from Animal Tuberculosis.—While the financial loss caused by tuberculosis of farm animals cannot be calculated with exactness, a study of the subject affords a basis for estimates sufficiently close to show that it is a serious drain on the live-stock industry.

Loss on Tuberculous Animals Slaughtered.—The writer recently made an effort to collect reliable data as to the loss caused by tuberculosis in animals slaughtered under government meat inspection. Carefully compiled figures were obtained from a number of large firms engaged in the slaughtering and meat-packing business, in one instance the calculations covering an entire year's business. In arriving at the loss the general method, in brief, was to deduct from the average cost of a live animal of a certain class the average amount realized from a tuberculous carcass of that class, the difference representing the loss.

Under the inspection system the animals found tuberculous are disposed of in three classes, according to the extent of the disease. Carcasses which show very slight infection may often be safely passed for food after the removal of the lesions, the loss in such cases, of course, being small. Other carcasses, affected to a somewhat greater degree, but still not badly diseased, are allowed to be rendered into lard or tallow at a sterilizing temperature after all diseased portions have been cut away and condemned. In these cases the loss is more considerable. A third class comprises carcasses that are considered unfit for food in any form and are totally condemned. The loss on these is still greater, amounting in the case of cattle to about three-fourths of the cost. The salvage consists of the hide, grease, fertilizer, etc

The loss on condemned adult cattle was found to vary from $10 to $75 a head, according to grade, price, weight, etc. While the loss per carcass is, of course, heavier on the higher priced animals, the proportion of condemnations is much greater among the cheaper grades. After weighing these factors and studying the figures the writer has concluded that for the purpose of this paper the condemned cattle may be grouped in two general classes, one representing about the average of the better grades, including those known as native and western cattle, in which steers largely predominate, and the other representing the cheaper grades and lighter weights, including "cutters" and "canners," largely cows. At present Chicago market prices, the loss on the first class, when condemned, is estimated at $45 a head, and on the second class at $18 a head. These figures are believed to be conservative, and below rather than above the actual losses, as are all the estimates made in this article. It is also estimated that two-thirds of the condemnations occur in the cheaper class of cattle and one-third in the higher class. This proportion gives $27 a head as the general average loss on condemned cattle. On carcasses rendered into tallow the average loss is estimated at $20. On a percentage basis the combined average loss on cattle carcasses condemned and those rendered into tallow is about 70 per cent. of the cost of the live animals. The loss on beef carcasses passed for food is very slight, being estimated at 50 cents each.

The loss on calves condemned is about $7 a head, and the loss on those passed for food after condemning an organ or part is estimated at 25 cents a head.

The average loss on tuberculous hogs is estimated at $8.50, or 55 per cent., on those condemned, $5.75, or 38 per cent., on those rendered into lard, and 50 cents on those passed for food.

Applying the foregoing figures to the number of animals found tuberculous in the Federal meat inspection during the fiscal year ending June 30, 1908, the annual loss is as follows: Cattle, $710,677; hogs, $1,401,723; sheep and goats, $35; making a total of $2,112,436. The significance of this loss may be better appreciated when it is known that tuberculosis is the cause of two-thirds of the entire loss resulting from condemnations at the time of slaughter in the meat-inspection service.

The loss on animals slaughtered without Federal inspection cannot be so readily computed. Some States and municipalities have more or less efficient inspection systems, but the great majority of the animals slaughtered without government inspection are not subjected to inspection of any kind, and it has already been pointed out that tuberculosis is doubtless more prevalent among them than among those coming under Federal inspection. It is safe to say, however, that without inspection the actual loss is very slight. Nevertheless the writer is of the opinion that the loss should be

computed as it would occur under efficient inspection. Applying to the number of animals slaughtered without Federal inspection the same factors that were used for those coming under inspection, but assuming that the cattle are generally of an inferior quality and worth 25 per cent. less, it is estimated that the loss because of tuberculosis among animals slaughtered without government inspection would, if proper inspection were applied, reach $1,720,000 a year, making the aggregate estimated loss on all food-animals killed in the United States $3,832,436 annually.

Depreciation in Value and Other Losses.—Aside from the loss on animals slaughtered, tuberculosis unquestionably causes a considerable depreciation in the value of those remaining alive. There are no definite data upon which to calculate this depreciation, but it is entirely reasonable to estimate that tuberculous milch-cows decrease in value annually at least one-tenth of what the loss would be if they were slaughtered and condemned, while other cattle depreciate annually one-third, and hogs one-half of such loss. On this basis, taking the estimate of the Bureau of Statistics of the Department of Agriculture as to the number and value of farm animals in the United States January 1, 1908, and assuming that 10 per cent. of dairy cattle, 1 per cent. of other cattle, and 2 per cent. of hogs are tuberculous, the total annual depreciation is no less than $8,049,998.

Tuberculosis also has the effect of decreasing the productiveness of dairy cows by diminishing the yield of milk as well as in some cases by shortening their lives and consequently the period during which they produce milk. Again, the amount of the loss is largely a matter of conjecture, but the writer feels that he is within reason in estimating that the average milk yield of a tuberculous cow is 10 per cent. less than that of a healthy cow, and on this basis the annual loss, valuing milk at wholesale prices, is $1,150,000.

Serious damage is caused by tuberculosis from the standpoint of breeding. The disease is found to a greater extent in pure-bred herds than in common stock. In adding fine animals, with a view to "breeding up" his herd, an owner may unwittingly also introduce tuberculosis, with disastrous results. By causing unthriftiness and impairment of fecundity, the disease has an adverse effect upon the number and value of the offspring.

The influence of tuberculosis toward increasing the cost of meat and dairy products has already been alluded to. There is also a considerable economic loss resulting from the destruction of cattle in the efforts already being made in some States to eliminate the disease. The trade in live animals and in animal food products also suffers losses because of tuberculosis. Doubtless there are still other sources of loss chargeable to this disease in live-stock, such as the expense of maintaining a sanitary service, disinfection of premises, etc.

The Aggregate Loss.—Taking into consideration the various items men-

tioned, the tribute which the United States pays each year to this scourge among its farm animals aggregates more than $14,000,000. Such a loss is too great, merely as a matter of economics, to be allowed to continue and increase from year to year. And when, in addition, we consider the bearing of animal tuberculosis on human health, it seems imperative that vigorous measures should be taken to eradicate the disease from our herds, especially when such eradication seems entirely possible and practical.

The Control and Eradication of Tuberculosis.—Any efforts to reduce or control tuberculosis of live-stock in order to be of lasting value must have eradication in view as the final object. We should not temporize with such an insidious malady, but should adopt aggressive measures that will insure success within a reasonable time.

It has been clearly shown by the work of the Bureau of Animal Industry and by other investigations that hogs readily contract tuberculosis from cattle, and that diseased cattle are the primary source of the infection in hogs. The main problem, therefore, is to eradicate the disease in cattle, and when this is accomplished, tuberculosis may easily be eradicated from hogs.

The eradication of animal tuberculosis may as well be recognized at the outset as a tremendous undertaking which will require not only the best efforts of the authorities in charge, but the sympathy and support of stock-owners and the general public. Large sums of money will be necessary, and in order that adequate appropriations may be obtained, the necessity and importance of the work must be generally realized and understood.

What May be Done by Individuals.—Much can be done by the individual stock-owner, with proper assistance, to exclude and eliminate the disease from his animals. He should be careful to avoid the introduction of tuberculosis into his herd by requiring that any cattle purchased shall have passed the tuberculin test. He can also do much to promote the health of his animals by keeping them in sanitary stables and under hygienic conditions. When tuberculosis is suspected, he should notify the authorities and have his cattle tested. When the presence of the disease is known, the safest course is to have the affected animals slaughtered, but in the case of valuable breeding stock, where slaughter would involve great sacrifice, the Bang system of segregation may be used.

Educational Work.—The individual, however, must first be aroused as to the danger of having tuberculosis in his herd and the importance of eradicating it, and he must also be informed as to the nature of the disease and the best methods of combating it. Valuable work in this direction may be done by the general and agricultural press and by official publications, also by lectures at public gatherings, farmers' institutes, etc.

Government and State Measures.—If the campaign for the eradication of

animal tuberculosis is to be comprehensive, systematic, and generally successful, it must be directed by Federal and State officials, conjointly, who must be armed with adequate laws and funds and supported by public opinion. Excellent work has been done by the authorities of several States during recent years, but a study of the laws and regulations of all the States shows that in most of them the importance of the subject is not appreciated. Thirteen of the States at present require the tuberculin test on cattle brought in, this requirement usually being limited to cattle intended for dairy or breeding purposes. Fourteen States have provisions for the slaughter of animals found affected with tuberculosis and the payment of indemnity to the owners, while a few others give authority for condemnation and slaughter without making provision for indemnity.

The work of the Federal government, as carried on by the Bureau of Animal Industry, so far consists in supplying tuberculin free of charge to State officers, in endeavoring to prevent the interstate shipment of tuberculous animals, and in tracing, when practicable, the origin of animals found affected with tuberculosis in the meat-inspection service, and notifying State authorities.

As a basis for further work Federal and State authorities should first determine to what extent and in what localities tuberculosis exists to the greatest extent among live-stock (where this has not already been done), and should first apply the tuberculin test generally and systematically to cattle in such sections.

The safest way of disposing of reacting animals, as previously stated, is to slaughter them. In order to reduce the financial loss to a minimum and at the same time guard against the sale of unwholesome meat, it is well to have such animals slaughtered at abattoirs under Federal or other competent veterinary inspection. In this way a large proportion may be safely passed for food and made to yield their full meat value, while only those whose meat may be dangerous to health will be condemned.

In herds where the disease is found it is advisable to repeat the tuberculin test at intervals of six months, and after the disease has apparently been wiped out, the test should still be applied once a year until it is known that infection does not remain and has not been reintroduced. Inspectors should be stationed at important points for the purpose of testing cattle for breeding and dairy purposes, and each State that is endeavoring to eradicate the disease should require that no cattle for breeding or dairy purposes shall be admitted from without the State unless they have passed the tuberculin test. A good method of preventing the spread of tuberculosis among breeding stock would be the establishment by the State of one or more free herds of breeding cattle for the use of stock-raisers in the State, or the State could certify to the health of free herds.

An effective means of locating and eradicating tuberculosis of live-stock would be to establish by State legislation a system of tagging cows sent to market from infected districts for slaughter, so that when any are found tuberculous in the meat inspection, they may be traced back to the place of origin, centers of infection located, and steps taken for eradication. The Bureau of Animal Industry is already coöperating with the authorities of some States by reporting on tuberculous animals, and the results so far have been very encouraging. To give the plan general application, authorities should be empowered by law to require that shippers shall tag their cows in such a way that they may be identified and their origin determined.

As the eradication of tuberculosis is largely a public health measure, it is only reasonable that the State should compensate, at least in part, the persons whose cattle are slaughtered. This is not only fair, but it is absolutely essential if the coöperation of the cattle-owners is to be secured.

It will be seen from the methods above discussed that in carrying on work for the eradication of animal tuberculosis in the United States, hearty coöperation and concurrence of action between the Federal and State governments will be essential. Under the Constitution the power of the Federal government in such matters is limited to those aspects which concern interstate commerce, and if a State fails to do its part, the Federal government cannot step in and carry on the work. What the Federal government can do in such a case, however, is to quarantine the State or a portion of it, and thus prevent the movement of animals from such a State; but while this action would protect other States, it would not help the situation within the State.

Benefits of Eradication.—The economic advantages of eradicating tuberculosis from farm animals are too apparent to require extended discussion. They will come to the individual stock-raiser and dairyman as well as to the public and the nation. Breeders are beginning to understand that it is unprofitable to go on raising cattle while tuberculosis exists in their herds. The practice is becoming more general for buyers of breeding and dairy cattle to have such animals tested before placing them in their herds, and the breeder who can give assurance that his herd is free from tuberculosis has a decided advantage in making sales. With the agitation in favor of a more wholesome milk-supply there is coming a growing demand for milk from healthy herds at higher prices, and as this demand increases, the dairyman who cannot show a clean bill of health for his cows will find it more difficult to market his products.

To overcome the losses above enumerated is worth considerable effort and expense. The benefits to follow from the eradication of tuberculosis from farm animals are so great and so obvious that the necessary expenditures, even though they must be heavy, may be regarded as a highly profitable investment.

ECONOMICS AS A POSITIVE FACTOR IN THE DISSEMINATION OF TUBERCULOSIS IN ANIMALS.

By O. E. Dyson, M.D.C.,
Chicago, Ill.

Economics as a positive promoting factor of the wide and constantly increasing spread of tuberculosis in domesticated food-producing animals, and in milch-cows especially, has never been candidly considered in its true light; otherwise, it would not be given greater consideration than that of the primary cause, of which the world was in ignorance until enlightened by Prof. Koch, who not only succeeded in demonstrating that the tubercle bacillus had a material existence, but that, from the standpoint of contagion, it was dependent upon bacterial laws requiring the primary existence of a host, thus precluding the possibility of its spontaneous origin.

The fact has also been clearly demonstrated that the contagion of tuberculosis promptly surrenders to the operation of hygienic and sanitary control, the principles of which are based upon a logical conception of the immutable laws of cause and effect. Notwithstanding this, however, the question of economics involved has been given more consideration than the cause, with the result that little or no rational effort has been made toward the eradication of tuberculosis in animal species, and particularly in dairy cows—a positive and well-known source of contagion permitted to exist only through lack of public sentiment being intelligently and authoritatively directed to the facts as they exist.

That public sentiment has been and still is subservient to the question of economics, involved in the matter of eradicating tuberculosis, can only be explained by reason of the fact that while tuberculosis is by far the greatest existing menace to public health and live-stock interests, its manifestations are insidious rather than epidemic, and resulting deaths in the human family occur with uniform regularity and in definite ratio to the population; in contrast to sudden outbreaks of other contagious or infectious diseases which quickly kill comparatively few before being eradicated by the application of modern sanitary and hygienic principles enacted into laws and rigorously enforced.

The same status of affairs, relatively speaking, exists with reference to food-animal species, with exception of the fact that tuberculosis is seldom,

if ever, the direct cause of death; in contrast to sporadic outbreaks of other contagious and infectious diseases. Consequently tuberculous animals, and milch-cows especially, even though extensively affected with a generalized form of the disease, unless subjected to the tuberculin test are seldom detected until slaughtered, and then only under the more than efficient supervision of the Federal Meat Inspection Department. Previous to slaughter, through the cupidity of their owners and negligence on the part of State and Federal legislators, such diseased animals are permitted to serve as an unrestricted source from which the infection of tuberculosis is spread to others of their kind, including hogs, and also, no doubt, through milk and butter products to susceptible individuals of the human race—with the ultimate result that even the economic loss resulting in the final condemnation of the affected animal carcass, when slaughtered under Federal inspection, is thrown upon the shoulders of those who are in nowise responsible for the infection; whereas if the economic losses annually sustained as a result of the disease in animals could be placed where they rightfully belong,—that is, upon the producer,—the eradication of tuberculosis in dairy herds and other food-producing animals would be a question of but a few years, and public health, now constantly endangered as a result of existing conditions, would be protected.

On the other hand, if a municipality, State, or the Federal government could be held responsible to the extent of five or ten thousand dollars for the death of every individual caused by the effects of tuberculosis, tax-payers, in order to relieve themselves of an unnecessary economic burden, would not hesitate to quickly and authoritatively direct that prompt and effective steps be taken toward the eradication of tuberculosis in dairy cows and pure-bred cattle herds, with the object of reducing its prevalence in man.

From an economic point of view tuberculosis constitutes a mortgage of the Shylock variety upon a large percentage of the cattle and hogs now produced in this country. Upon that mortgage at least five million dollars must be paid as an annual interest charge. Of this amount, three million dollars may be charged to losses sustained through the condemnation of affected food-animal carcasses as a result of our present system of United States meat inspection, which is conducted at a cost to the Federal government of three million dollars per annum, two-thirds of which would be an unnecessary expense were it not for the prevalence of tuberculosis in animals. Therefore, the sum of $5,000,000 per annum may be charged directly to failure on the part of legislators of various States and the Federal government to recognize the fact that tuberculosis is a preventable disease, and that it could be eradicated by a logical application of modern sanitary laws coupled with hygienic and economic principles, thereby eliminating such losses entirely within the next few years.

As a precedent in substantiation of the above claim may be cited the fact that more highly contagious forms of disease—namely, contagious pleuropneumonia and foot-and-mouth disease in cattle—have been promptly eradicated by the application of rational sanitary laws and economic principles, in face of the fact that little was known then, or even now, concerning the specific cause of their contagion, in contrast to the well-known principles involved in the spread of tuberculosis. Therefore is it not reasonable to claim that in case diseases due to unknown causes can be completely eradicated by the application of well-known sanitary laws and economic principles, tuberculosis, being much less contagious and comparatively easy to control, should at least be eradicated from all animal species?

Furthermore, while the health of consumers of United States inspected and passed meats and meat food-products is protected against a remote possibility of tubercular infection from that source, at a total expense of approximately five million dollars per annum, practically nothing is spent by many States or the Federal government to protect the consumers of milk and milk food-products derived from cows known to be affected with tuberculosis, when such products are unquestionably admitted by all recognized authorities to be a thousand times more dangerous to consumers than the flesh of the affected animal. And yet such products are generally permitted to be locally consumed and to enter into interstate trade without the slightest restriction.

This condition of affairs should also be coupled with the fact that more than 90 per cent. of the carcasses of all cattle condemned under the operation of the United States Meat Inspection Act are those of cows condemned on account of tuberculosis, and that the percentage of such cattle never constitutes more than one-third of the total number of cattle officially inspected at the time of slaughter; thus unquestionably leaving fully two-thirds of the total number of diseased cows to be slaughtered by local butchers throughout the country, who regularly dispose of the flesh of such diseased carcasses to unsuspecting consumers, who have also, perhaps for years, consumed milk and butter products derived from such tuberculous cows, in blissful ignorance, or with little thought of the possibility, that they were consuming or that they were perhaps feeding a disease-infecting food-product to helpless children who were unable to make known their wants in the matter of food selection with reference to its purity and wholesomeness. How many children's lives have thus been sacrificed in infancy, due to the cupidity of dairymen, and ignorance on the part of parents, will never be known, nor is it possible to estimate the number of adults infected as children, and thereby destined to sacrifice their lives as a result of ignorance on the part of political representatives, avarice and greed on the part of dairymen and the owners of pure-bred cattle herds, who to-day are resisting with all their might

any interference with their present privilege of peddling the contagion of tuberculosis broadcast throughout the land, by and with the full knowledge of legislators, both State and Federal, who are willing to juggle with the cause of a death-dealing infection apparent on every hand. Lack of specific knowledge may be claimed by legislators in answer to the above accusation. If so, then they are clearly unfit to hold an office where the future welfare and even the lives of people living in their respective districts are necessarily to a great extent endangered as a result of their representative's lack of information.

What can be said in favor of State legislators and municipal authorities who knowingly permit unscrupulous dairymen to sell the products of a diseased dairy herd to unsuspecting consumers?

What incentive is offered to the owner of a dairy herd that is free from disease, to keep it so, when he must meet in competition the products of a diseased herd?

What can be said in favor of the large and influential pure-bred cattle-producers of this country, who always have and will, no doubt, indefinitely continue to oppose the enactment of any laws which would in any way curtail the privilege or the resulting profit which they have long enjoyed, through being permitted to scatter the infection of tuberculosis throughout the country by selling diseased animals at fabulous prices to unsuspecting purchasers, who in turn allow the disease a further unrestricted spread?

What can be said in favor of a pure-bred cattle-breeders' association, organized ostensibly for the purpose of improving or maintaining the purity of a breed, which will permit the registration of animals from herds known to be affected with tuberculosis, thereby advancing the cause of tubercular infection? And why do most of these associations oppose all efforts on the part of progressive States and the Federal government to enact laws by which this disease could be eradicated?

What can be said in favor of State laws which require a certificate of health for all breeding cattle or milch-cows shipped into the State, and permit without question the unofficial administration of the tuberculin test, and the sale of reacting cattle within the State, or the shipment of diseased animals from the State to other States which have failed to protect themselves by the enactment of similar laws?

Great efforts have been made to improve the breed of cattle in this country without regard as to whether or not they were affected with tuberculosis. What is accomplished by wasting time and feed upon diseased cattle, when one healthy scrub steer, if purchased subject to post-mortem inspection under the present regulations of the United States Meat Inspection Department, would have a market value many times greater than a large number of

pure-bred steers which regularly win prizes at State fairs and live-stock expositions?

What can be said in favor of the management of State fairs and live. stock expositions, which are supposed to encourage the advancement of live-stock interests, when premiums in the cattle classes are awarded indiscriminately to diseased and healthy animals, and no precautions taken to protect a healthy animal from becoming infected with tuberculosis by being exposed to those which are diseased and unfit for any purpose other than deceptive exhibitions of merit? How can live-stock interests be advanced by the awarding of prizes to tuberculous animals, when a tuberculin test and a certificate of health would prevent such a common infraction of justice?

In contrast to the above-mentioned facts as they prevail may be asked: Why is it that horses with a slight physical defect, such as a splint, are rejected at such expositions in favor of sound animals of otherwise less merit? Simply and solely for the reason that the defect is apparent to even the casual observer, and affects to a certain degree the market value of the animal. To judge cattle by the same standard, it is admitted by the managers of live-stock expositions and others well informed, would result in excluding fully 50 per cent. of practically all pure-bred herds from participating in such shows. How long such deception will be permitted to last, in the face of its economic status, can only be surmised.

What can be said of the mental caliber or the integrity of any man, regardless of his ownership of a herd of tuberculous cattle, or the fact that he may be at the head of an agricultural college, a State or Federal legislator, or the publisher of a live-stock journal, when he, without hesitancy, is willing to cast aside and endeavor to discredit the accumulated knowledge of time and a host of pioneers in the field of research and experiment with reference to the efficacy of tuberculin as a diagnostic agent when properly administered? Such men would, no doubt, if opportunity afforded, mortgage posterity to the ravages of an everlasting plague and call it "self-protection"; or prate the fact of their loyalty to friends or political constituents who are economically interested in the further development of tuberculosis in dairy and pure-bred cattle herds.

The excuse of ignorance might possibly be advanced to the credit of all such men, with the exception of the publisher of a live-stock journal. With him, such an attitude is merely an evidence of a conscience warped in the direction of an economic gain to be secured at the expense of public health and ignorance, by the sale of advertising space to well-known breeders of diseased cattle, who are thus enabled to sell to credulous purchasers animals which, on account of disease, are unfit for either food or milk production, and only serve to depreciate the value of any herd to which they may be added on account of the contagion which they invariably spread.

How is it possible to advance the live-stock interests of this country if the live-stock journals, which profess to have the interests of the producer at heart, cannot be trusted to assist in guarding, or at least advising, their patrons against the purchase of diseased animals for the purpose of an effort to improve their herds? As a result of existing conditions the average producer is being constantly buncoed by the purchase of cattle of the gold-brick variety, which are regularly and extravagantly advertised in live-stock journals, much to the detriment of the live-stock interests at large.

Such is the situation now before us, which fully discloses the prevailing influence of economics in its relation to the spread of tuberculosis in animals. The time, however, is not far remote when there will be a full awakening of public sentiment to the facts as they exist. Then, and only then, can it be expected that the question of economics, in which comparatively few are concerned, will be substituted in favor of a demand for the protection of live-stock interests and public health—the latter unquestionably being a municipal, State, and national liability, and as such should be protected to the extent of utilizing modern achievements in the world of hygiene and sanitary science resulting from a knowledge of cause and effect.

In this connection, who would care to consume the products of a dairy cow known to be diseased, regardless of a positive knowledge of the transmissibility of tubercular infection from animal to man? And what authority can be cited as to the possibility of a child having more resistance to tubercular infection from infected milk than a hog, which every veterinarian knows to be highly susceptible to the infection? Therefore, would it not be well for medical authorities to coöperate with the veterinarians in efforts to remove possibly the principal source of tubercular infection to which the human is to-day exposed, rather than to depend upon sanatoriums and fresh-air funds to cure the disease after infection has taken place, with little or no possibility of such resources ever being able to keep pace with the present unrestricted sources from which the contagion of tuberculosis spreads?

Little can be said in favor of knowledge unapplied, as evidence of knowledge depends alone upon its practical application; therefore, unless the well-known and time-proved methods of successfully dealing with the question of eradicating tuberculosis can be applied now, the question of economics involved will later assume such huge proportions as to practically eliminate any further thought of eradicating the disease in animals; in proof of which the prevailing conditions in some of the European countries with reference to the disease may be cited as a logical sequence.

The eradication of tuberculosis in animals in this country unquestionably depends upon the enactment and rigorous enforcement of Federal laws to prevent the interstate shipment of any animal of the bovine species intended for breeding or dairy purposes, unless subjected to the tuberculin test and

authoritatively certified to as being free from disease. In addition to which, as a further incentive to various States to protect their own interests, and incidentally public health, the interstate shipment of milk and butter products should also be prohibited unless derived from cows known to be free from disease. The effect of such legislation and its enforcement would, no doubt, be to confine within each State the operations of many well-known promoters of tuberculosis in animals and probably the disease in the human race. Thus, by depriving these active agencies of a large proportion of the pecuniary profits they now enjoy, regardless of the welfare of others, the natural result would be to cause owners of tuberculous cattle to actively enlist their services and political influence in favor of the cause which they have so long and so successfully fought.

In order to prove that the eradication or control of tuberculosis in pure-bred cattle and dairy cows would serve a double if not a triple purpose, it is only considered necessary to cite the fact that they are almost invariably responsible for the infection of stock cattle and hogs. As these animals seldom, if ever, further transmit the disease to others of their kind, it is evident that by eliminating the principal source of their infection the disease in such animals would soon become eradicated as a result of their being consigned to slaughter at an early age. In addition to this, tubercular infection of our milk and butter products might also be guarded against.

History conclusively proves that no advance steps toward signal accomplishments in the matter of public health or the future welfare of the human race have ever been taken except by those who at the time of the initial movement were considered radical. Therefore, inasmuch as history, in order to be progressive, must repeat itself, no progress can or will be made toward the eradication of tuberculosis until radical steps are taken—after which conservatism will find its place.

La question économique comme facteur positif de la dissémination de la tuberculose chez les animaux.—(DYSON.)

La question économique n'a jamais été considérée par son vrai côté; autrement la tuberculose, comme d'autres maladies plus contagieuses encore pourrait être déracinee en un temps relativement court, par la seule application des principes modernes sanitaires et économiques.

Jusqu'à présent, l'influence économique des propriétaires de bétail de pur sang et de ces troupeaux de ferme qu'on sait être affectés de tuberculose, a, par des moyens politiques, empêché les législateurs des états et les législateurs fédéraux, de passer des lois nouvelles, nécessaires pour combattre le trafic des animaux malades ou les produits de laitage provenant de troup-

eaux infectés. En outre, les propriétaires des vaches malades ont réussi à empêcher l'application des lois déjà votées, qui seraient appliquables et qui pourraient avoir de bons résultats.

Contre la propagande anti-tuberculeuse une campagne a été menée par ceux qui étaient économiquement intéressés à répandre la maladie dans tout le pays; à cette campagne ont pris part les propriétaires de bétail pur sang, des troupeaux de ferme et les associations des marchands de bétail avec lesquelles ils sont alliés. Ensuite, on vit dans cette campagne les administrations des foires des états et des expositions d'animaux, les administrateurs pensant sans doute que les bêtes saines ne doivent pas être appréciées davantage que les malades, alors que vient le temps de la distribution des prix annuels. Enfin, "last but not least," cette campagne a été supportée par les journaux, qui vivent en protégeant les intérêts des marchands de bétail, auxquels il vendent leurs pages pour faire la réclame aux bêtes tuberculeuses, lesquelles peuvent être vendues ainsi, à des prix fabuleux; comme conséquence de ce trafic, les acheteurs, crédules, à leur tour, permettent à la maladie de se répandre plus loin. Et on demande aux rédacteurs de ces journaux, quoiqu' eux-mêmes soient bien informés sur les dernières données scientifiques, de discréditer les resultats de la science et de discréditer tous les pioniers de la recherche et des expériences, afin que les lecteurs ne croient pas à l'efficacité diagnostique de la tuberculine, efficacité certaine quand celle-là est proprement administrée.

L'extirpation de la tuberculose chez l'homme et chez les animaux dépend sans nul doute d'un arrangement tel, qu'il y ait un intérêt économique à la santé; le résultat serait que le savoir remplacerait l'ignorance et de là résulterait la soumission inconditionnée à l'application de l'hygiène moderne et de la science, délivrée de la mauvaise influence politique et de la cupidité des propriétaires de bétail pur sang et de troupeaux de ferme.

Selbstsüchtige Sparsamkeit als ein Faktor der Verbreitung der Tuberkulose unter Tieren.—(DYSON.)

Es wird gezeigt werden, dass Sparsamkeit nie in ihrem wahren Lichte betrachtet worden ist, andernfalls könnte Tuberkulose gleich anderen ansteckenden Krankheiten in einer verhältnismässig kurzen Periode durch die Anwendung moderner sanitärer und ökonomischer Prinzipien ausgerottet werden.

Der Einfluss der Sparsamkeit in den Händen der Eigentümer reinblütiger Rinder- und Milchviehherden, von denen man weiss, dass sie von Tuberkulose befallen sind, hat bisher durch politischen Einfluss Staats- und Bundes-Gesetzgeber abgehalten, hinzugefügte und notwendige Gesetze passieren

zu lassen, um den Handel mit erkranktem Vieh oder den Milch- und Butterprodukten von angesteckten Viehherden zu verhindern. Im Zusatze dazu sind die Eigentümer erkrankter Herden in der Verhinderung der Durchführung angenommener Gesetze durch Staats- und Bundes-Autoritäten erfolgreich gewesen, die anwendbar sind, und mit guten Resultaten angewendet werden konnten.

In dem Feldzuge der gegen die Ausrottung der Tuberkulose von diesen durch selbstsüchtige Sparsamkeit Beeinflussten und der dadurch verursachten Verbreitung über das Land haben sich die Rinder- und Herdenbesitzer und die mit ihnen verbundenen Versicherungsgesellschaften in eine Linie gestellt. Als nächstes kommen die Veranstaltungen staatlicher Feste und Vieh-Ausstellungen, welche ganz bestimmt auf dem Standpunkte stehen, dass gesunde Tiere nicht mehr Berücksichtigung erhalten sollten als die erkrankten, wenn es gilt, Preise bei ihren jährlichen Vorführungen zu erlangen. Last, but not least, kommt die nahezu einmütige Unterstützung der interessierten Zeitungen, welche sozusagen ihren Unterhalt durch den Verkauf ihrer Reklamespalten an die wohlbekannten Eigentümer erkrankter Herden beziehen, die dadurch in Stand gesetzt sind, erkrankte Tiere zu fabelhaften Preisen an leichtgläubige Käufer zu verkaufen, die dadurch der Krankheit eine weitere Verbreitung in uneingeschränktem Masse sichern. Wenn dadurch in der Unterstützung einer solchen selbstsüchtigen Sparsamkeitspolitik von Seiten der Herausgeber solcher sich mit Viehzucht beschäftigenden Zeitungen selbst gegen ihre bessere Überzeugung gedrängt sind, die angesammelte Kenntnis und die Pioniere auf dem Feld der Ausforschung und Experimentierkunde mit Rücksicht auf die Wirksamkeit des Tuberkulins als ein diagnostisches Agens, wenn richtig angewendet, in Misskredit zu bringen, wird man sich kaum über die traurigen Resultate wundern können. Die Ausrottung der Tuberkulose in Mensch und Tier hängt fraglos von einer richtigen Verbindung mit ihren nationalökonomischen Beziehungen der Gesundheit ab, welche zur Folge haben musste, dass Kenntnis die Ignoranz verdrängt, wodurch bedingungslose Möglichkeiten für die Anwendung moderner Hygiene und Gesundheitslehre geschaffen wurde, frei von dem gepriesenen politischen Einflusse und der Habgierde der Herdenbesitzer.

DISCUSSION.

Dr. Moore (New York): I would like to ask Dr. Melvin about the number of tuberculous animals—whether the statistics mentioned in his paper represent the number of condemned or infected animals?

Dr. Melvin: The total number that were infected, that is, with reference to meat inspection.

Dr. Pearson: Dr. Melvin has brought out the first statement as to the approximation of the money losses that I have ever seen. I think he presented for the first time an estimate of the actual loss as a direct result of the disease. His estimate was something more than $8,000,000. There are other losses which might very properly be brought into the estimate, such as those sustained by breeders, which are very discouraging. These men have often given up breeding, owing to the loss due to this disease. There is not only a loss to the breeder, but there is also a great loss to the public in general. Everything that diminishes the efficiency of the live-stock industry tends to reduce the price of live-stock.

Dr. Dawson (Delaware): I have been struck with the enormous losses resulting from the disease as pointed out in these papers, and yet they do not represent all the losses, since they do not include the cases of natural deaths of animals from tuberculosis. By including this item it would show a considerable increase in the prevalence of the disease. This is particularly true of Texas fever in the South.

Dr. Pearson: This is a natural item which was not included in Dr. Melvin's paper.

Dr. Ward (California): I wish to state an experience which came under my observation in California, where two breeders of Holstein cattle had to go out of business due to the losses from this disease. It is evident that these animals were passed on to the next fellow, and these herds were known to be affected with tuberculosis. Thus, in this way it will readily be seen how the disease can be disseminated.

Dr. Nelson (Washington): The items included in these reports are certainly very astounding—$8,000,000 a year. They indicate the enormity of the losses resulting from the effects of tuberculosis. It is pretty hard to appreciate these facts, much less to discuss them. These papers contain such prominent and definite facts that it is more for observation than discussion. What are we going to do about it? It should bring about a determined action of the profession toward educating the general public and dairymen to thus control the disease with their coöperation.

Dr. Rogers (Kansas): Apropos of Dr. Dyson's remarks upon advertising space given to pure-bred breeders; in 1905 I proposed that the Post-office Department should and could legitimately refuse second-class mail privileges to papers that accept and print advertisements of pure-bred stock not guaranteed to be free of tuberculosis, for a fraud order would seem to be within the confines of justice and honesty as interpreted in 1908. You know about patent medicine frauds.

Prof. Arloing: I wish to inform this audience of the great interest which the French people are taking in the good work of the United States toward the control of tuberculosis in animals, and I also wish to recognize the splendid

work accomplished in the line of immunization by the honorable President of this Section. I desire to emphasize the high character of the work done by veterinarians in that direction, and to mention the importance of this disease to our profession, not alone from its economic side, but also from the standpoint of its relation to the public health.

DR. PEARSON: I have the honor to call upon Prof. Heymans with reference to the control of tuberculosis of cattle in Belgium.

PROF. HEYMANS: I will speak of the results accomplished in Belgium toward the controlling of tuberculosis of animals. Belgium has a population of about 8,000,000 people and about 2,000,000 cattle, of which 1,000,000 are cows, while the other million represents other cattle. The tuberculin testing was put into practice in 1895, and accordingly we have had fourteen years of experience with the testing for the disease in our country. Of the cows, 400,000 reacted to tuberculin, and of the other stock about 10 per cent., the average amounting to 25 per cent. Belgium has a general meat inspection law in operation, and not a single food animal is slaughtered without subjecting the same to an expert examination. The results and statistical compilations show only about 5 per cent. of the examined animals to be affected with tuberculosis, which clearly indicates the uncertainty of the macroscopical examination. Belgium as well as France recognizes the absolute reliability of the tuberculin test, and the differences in the results from this test and those of the macroscopical examination only show the imperfectness of the post-mortem examination. The Bang system was tried for the first time in 1895, and it was extensively applied under government support. In the execution of the system it was decided to destroy all reacting animals within one year after the reaction, but it was found that such a large number reacted (40 per cent.) that it was decided to extend the time limit to two years, then to three years, and finally the owners could keep the reacted animals for an indefinite time. The State allowed 50 per cent. of the market value for the condemned animals, but the losses from this source were so great that they amounted in the course of a few years to 15,000,000 francs, and with hardly any beneficial results. The failure can be attributed to the difficulty which lies in the execution of the Bang system, as the stock-owners are usually careless in the execution of this system. At the present time it is the aim in Belgium to control tuberculosis of cattle by an improved method: namely, first, to discover all tuberculous animals; second, to destroy the highly infected cases; and, third, immunization. Everything points toward better results from this latter method.

A STUDY OF THE TUBERCULOUS CONTAMINATION OF THE NEW YORK CITY MILK-SUPPLY.

By Alfred F. Hess, M.D.,
New York.

One of the most important questions to-day which confronts those fighting the spread of tuberculosis is: What proportion of infection is human in origin, what proportion bovine in origin? It is not necessary for me to review in this place the various answers that are given this question by sincere and capable workers in the same or different countries. In the United States we find Theobald Smith stating that, in his belief, not over 1 per cent. of tuberculosis is of bovine origin, and, on the contrary, others—for example, Ravenel—believing that a considerable percentage of the disease is of this origin. The British Tuberculosis Commission recently reported that "a very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli." In view of such conflicting statements on a subject of such vital importance, physicians and laymen are, at the present time, undecided whether they should concentrate their energies against the dangers from the tuberculous individual, or whether they must guard against a dual source of infection. Prophylaxis suffers from this indecision.

The object of my work was to prove one of the elemental phases of this broad question; to ascertain how often milk supplied to a large city, such as New York, contained virulent tubercle bacilli; and also to study the nature of these bacilli, to learn whether they conformed uniformly to the bovine type. I realized that the presence of tubercle bacilli in milk does not necessarily furnish an index of the frequency of infection of those who drink such milk. Nevertheless it is important that we should at the outset have an approximate idea of the incidence of tubercle bacilli in the market milk. I found experiments of this nature surprisingly few in number and conflicting in results. The New York city milk had never been investigated in this particular, and examinations which had been made elsewhere were, for the most part, incomplete, or dated back to a period when our milk was obtained under conditions quite different from those which exist at the present time. However, since I began this investigation last year a comprehensive report

of the tuberculous contamination of the milk-supply of the city of Washington has appeared, to which I shall refer in detail later. You will find the literature of this subject well abstracted in this publication.[1]

The second part of my investigation consisted in isolating in pure culture some of the tubercle bacilli found in the milk, and in differentiating them according to type. This was undertaken in order to learn whether all the cultures would prove to be bovine, as was to be expected considering their source, or whether we might find human or intermediate varieties. It seemed that the previous work in this regard should be supplemented, and that more strains should be isolated from bovine material, to judge more certainly of the distinction between the two types of bacilli.

The material was obtained in the following manner. In the tests of raw milk specimens were gathered only from the large forty-quart cans, and not from bottled milk. This was done partly because the facilities of the Health department rendered it simpler, but more especially because more than one-half of the milk sold in New York is not bottled, but constitutes the so-called "loose milk." The fact that unbottled milk forms such a large proportion of the municipal supply is sufficient in itself to warrant its selection as a basis for examination. Furthermore, loose milk and bottled milk are frequently identical, are dispensed by the same dealer, and derived from the same dairy. The specimens were collected in the same manner as those brought to the laboratory twice a week for general bacteriological examination. I used the same sterilized one-ounce bottles with a tight-fitting tin cap. The milk was taken indiscriminately from grocery stores, dairies, and large plants in the various quarters of the city. Two specimens were dipped out from each can, one for the bacterial count, another for examination for tubercle bacilli; six to twelve were collected at a time for my purposes. In most cases I obtained the milk myself. and my selection was guided merely by an attempt to obtain specimens from dealers who had small children who drank this milk. This was done with the object of determining the subsequent health of these children, and will form the basis of a paper at some future time.

In the laboratory the specimens were kept in the refrigerator. Before being opened they were thoroughly shaken and then 10 c.c. of milk were removed by means of a sterile pipette, and transferred to a small tube, in which it was centrifuged from five to seven minutes. Two smears were made from the surface of the cream, which formed a solid layer at the top of the tube. The entire cream layer, which varied in amount, was removed by a sterile copper spoon and placed in a Petri dish. The skimmed milk was poured away and disregarded, with the exception of the lowest cubic centimeter, which was poured into another dish. Two smears were made from the dregs in the centrifuge tube. These two portions of milk, the cream and the lowest cubic centimeter, were drawn into small antitoxin syringes and

injected into two guinea-pigs. It was necessary to dilute the cream with a small quantity of salt solution in order to render it fluid. As far as possible unused pigs of medium weight were employed; however, in many instances I had to use larger pigs which had served as tests for diphtheria antitoxin. In order to make certain that such pigs were not previously tuberculous, fifty which had been used in this work were autopsied. In no instance was any tuberculous infection encountered. In the early tests the inoculations were made into the muscles of the thigh, following the recommendation of Ostertag. Later, however, subcutaneous inoculations into the groin were resorted to, as the disadvantages of the intramuscular method outweighed its advantages. It was found that the deep injections frequently gave rise to hematomata at the site of inoculation, that they were sometimes followed by sudden death, and that the inguinal glands enlarged less markedly than when the pigs were inoculated subcutaneously. For each inoculation a different syringe and needle were used. The pigs inoculated on the same day were kept in the same cage. Very few abscesses developed, probably owing to the fact that almost three-quarters of the inoculations were made deep into the muscle; those which did form, did not ulcerate through the skin. The animals were examined twice a week. They were not killed after a definite period, but in some instances, where cultures were not desired, they were allowed to live long after they were known to be tuberculous. In this way we could judge somewhat of the dosage and the virulence of the tubercle bacilli in the milk.

One hundred and twelve specimens of raw milk were tested in the manner described, but as in 5 instances the animals died within two weeks of inoculation or were lost in other ways, only 107 came under consideration. The tables (Table I and II) give a summary of the results. Nineteen specimens were found to contain tubercle bacilli. It was found, however, upon tracing these samples to their source, that 2 were duplicates, so that we must consider that th positive inoculations numbered only 17. Thus the figures resolve into 17 positive tests out of 107, which means that 16 per cent. of the milk contained tubercle bacilli.

In every one of these 17 cases, as well as in the 2 duplicates, tubercle bacilli were found at autopsy. The case was looked upon as negative unless the bacilli were shown to be present. For example, the autopsy of pig No. 436, killed three months after inoculation, reads as follows:

Somewhat emaciated; large bilateral inguinal glands; mesenteric glands hard, size of small marble; slight enlargement of iliac and retroperitoneal glands, spleen three times normal, containing a caseating abscess, and miliary tubercles. Liver showed miliary tubercles, lungs negative. At the time of autopsy these lesions were considered definitely to indicate tuberculosis, but as bacilli could not be found, and reinoculation tests proved

inconclusive, the case was rejected. In most instances reinoculation into a second series of pigs was made. In order to control the results still further and avoid the possibility of confusing the tubercle bacillus with similar acid-fast organisms, cultures were made in each instance. In those cases where serum or egg media was not employed, in other words, where the object was not to cultivate the tubercle bacillus, glycerin-agar was used. In no instance was an acid-fast organism encountered.

The smears made from the cream and from the sediment, of which mention has been made before, showed no tubercle bacilli. In no slide could they be definitely made out, although in those instances in which animal inoculations had demonstrated tuberculosis the slides were carefully examined for a second time. They showed a large number of bacteria and leukocytes; roughly, about an equal number in cream and sediment, but the number was found to bear no relation to the presence or absence of tubercle bacilli in the milk (Table II).

I next examined some "commercially pasteurized" bottled milk, making use of the same technic. Eight samples were obtained from three different plants, with the intention of using more samples, should these first tests give a negative result. The dealers of this milk state that it has been subjected to a temperature of 160° F. for forty seconds. In one of the eight samples tubercle bacilli were demonstrated by animal inoculation, which proves that this method in practice is inadequate to protect us from tubercle bacilli. Investigation in this particular was pursued no further.

In conjunction with this work an opportunity was afforded of obtaining tubercle bacilli in pure culture from milk. As the question of the possibility of separating the mammalian tubercle bacilli into two definite types, as proposed first by Theobald Smith, has not been settled to the satisfaction of all bacteriologists, it seemed worth while to isolate some strains and to differentiate them. The method used in this study was that employed by me in former work in this field.[3] For the first generation dog serum or egg medium was used. The morphology of the bacilli, facility of cultivation, and virulence toward rabbits were considered mainly in the differentiation. The ability of a culture to induce a fatal generalized tuberculosis in the rabbit was looked upon as evidence of its being of the bovine type. For this test intravenous injections of a standard emulsion were made.

Seven cultures were isolated. In two other cases cultures were attempted, but failed. The result is given in tabular form (Table III). A study of this table shows that a marked uniformity of type was found. All were of the bovine variety, without doubt. One culture grew more rapidly than the others, was more eugonic, to adopt a phraseology of the British Commission, but in virulence it conformed strictly to the bovine type. The number of cultures isolated and differentiated from bovine material have not

been numerous. Their paucity has led some, who did not recognize the duality of types, to insist that more cultures from bovine sources should be studied, before we look upon this means of differentiation as a reliable criterion. The importance of this criticism is appreciated when we consider that at the present time this slow and tedious method must form our main reliance, not only in deciding whether a case of tuberculous infection is of human or bovine origin, but also in judging of the relative importance to man of these two sources of infection. In this light the work which I report must be regarded as added testimony in favor of the value and reliability of the study of cultures of tubercle bacilli.

The milk examined must be considered a little below the average grade. Subsequent inquiry at the Board of Health revealed that of the 19 tuberculous specimens, 14 were sold by dealers who furnish bottled milk coming from the same farms (Table II). In some instances this bottled milk is commercially pasteurized, but, as we have shown, this process does not afford adequate protection. A circumstance which emphasized the reliability of my results was furnished by a chance control experiment. The samples of milk were in some instances selected at random from those sent to the laboratory by the inspectors. It so happened that of the 10 samples submitted on January 6th, 4 proved to be contaminated with tubercle bacilli (Table II). Recently on inquiring into the source of these samples I learned from the records that the 4 samples were taken from 2 cans in the same plant; in other words, that 2 were duplicates. This method of control specimens is resorted to by the Board of Health to compare the results of the bacterial counts. In this instance it served as an unconscious control of my work, and demonstrated its value. Again, on November 12th two positive specimens were obtained which emanated from the same wholesaler, although retailed by different stores in the same neighborhood. On December 5th this happened in three instances. This milk was supplied by some of the largest dealers in the city, and it seemed as if a considerable part of their supply was contaminated on these days.

In the test of the milk-supply of the city of Washington, reported this year by Anderson, 6.72 per cent. of the samples were found to contain tubercle bacilli.[1] This figure is considerably lower than that which I report for New York. This difference can be in part accounted for by the fact that in the Washington tests usually only one animal was used for each sample, and that the cream was not injected. Had the same procedure been followed by me, the number of positive results would have been decidedly fewer, as may be judged by the fact that of the 19 tuberculous specimens, only 9 produced tuberculosis in both of the injected animals. In 5 instances this was due to the death of one of the guinea-pigs. However, in 2 cases virulent tubercle bacilli were demonstrated in the sediment alone; in 3 others in

the cream alone; the animals injected with the negative portion of these samples developed no lesions or such lesions as were inconclusive. It is clear that, had I not injected the cream, 3 of the positive cases would have been reported as negative, which in itself would have reduced our figures from 16 to 13 per cent. Higher percentages than we obtained have been published by others. Rabinowitsch and Kempner found, in an examination of 25 samples of Berlin milk, that 7 samples, or 28 per cent., contained tubercle bacilli. In an examination by MacFadyean at the Jenner Institute, 17 among 77 specimens, or 22 per cent., were found to be infected with virulent tubercle bacilli.[5]

What importance is to be given to the fact that 16 per cent. of the general milk-supply of New York city is contaminated with virulent tubercle bacilli? The very size of these figures is proof that we all, young and old, must possess a considerable degree of immunity to the infection. For it is probable that few infants fed on the ordinary raw milk do not ingest tubercle bacilli during the first year of their lives; it is, I believe, more than probable that they do so repeatedly. Furthermore, we know that children are especially susceptible to tuberculous infection, and yet tuberculosis is by no means the main factor in the high death-rate of infancy. On the other hand, it is certain that the bovine bacillus is frequently, in childhood, the cause of tuberculosis of various organs: of the tonsil, of the cervical glands, and of the mesenteric glands. Among others, Theobald Smith, Fibiger and Jensen, the German and the British Commissions, and the writer have reported cases of this nature. Recently I was able to collect 44 cases of undoubted bovine infection of the mesenteric glands, 41 of which occurred in children. These figures are not sufficient to prove that bovine tuberculosis is the "great white plague" which we all are fighting, but they do show, without doubt, that this bacillus is fraught with danger to children. Even the stanchest supporter of Koch would not care to have his children drink milk from a cow which he knew was excreting tubercle bacilli. At present there seems to be insufficient basis for a statistical estimate of the importance of bovine tuberculosis, but we must remember that, even if we charge it with but 1 per cent. of the total tuberculous infections, this small percentage is sufficient to establish it as a disease worthy of active recognition. The total number of cases of tuberculosis, exclusive of duplicates, which were reported in Greater New York in 1907, was, according to Biggs, almost 20,000. Every one realizes that this figure is far below the actual number, and yet if we accept it, and if we consider only 1 per cent. of this yearly total to have been of bovine origin, we must attribute 200 of the reported cases to this cause. In view of the studies thus far carried out both here and abroad it would seem best, at the present time, to regard the bacillus of the human type as the cause of the great scourge, the scourge of tuberculosis, and to look upon the bovine bacillus as the cause of a definite but much less wide-spread type of disease.

Finally, the practical lesson which this investigation teaches is not new; it has been emphasized, with ever-increasing earnestness, by many of those here to-day. It is to be hoped, however, that the alarming degree of tuberculous contamination which I have found in the New York city milk, and the concrete figures which I have furnished, may prove an effective argument for those who are striving with the legislators in the cause of pure milk. It is unfortunate that it was not possible to trace the milk to its farm, and that I am unable to tell you of the physical condition of the cows or of the herds which supplied the milk; to state whether or not they were clinically free from tuberculosis. As I used mixed milk in my tests, it is possible that the bacilli which I found were, in some instances, given off by one infected cow and were diffused throughout the supply. No doubt this is true to a certain extent. However, we cannot well fall back upon this explanation when we reflect that a recent report by Moore showed that of 421 herds in New York State tested with tuberculin, 302 contained reacting animals. This high percentage of disease harmonizes with the high percentage of contamination which I found in the city milk. Again, the investigations of Schroeder, showing how frequently feces is present in milk, and how frequently tubercle bacilli are present in the feces of apparently healthy cattle, also point clearly to a wide-spread source of dairy infection. In view of these facts it would seem wise, as an immediate safeguard, to boil or thoroughly pasteurize all milk not coming from tuberculin-tested cows. At the same time those who are urging broader remedial measures, such as adequate inspection and supervision of the dairy herds, should be accorded the support of physicians and laymen alike. If New York city was granted, instead of 47 inspectors of farms, 150 such inspectors, it is certain that 16 per cent. of the milk sold in its precincts could not be found to harbor virulent tubercle bacilli.

TABLE I.—DATA OF MILK INOCULATIONS.

Date.	Number of Samples.	Animals Inoculated.	Died within Twenty-four Days.	Otherwise Lost.	Secondary Inoculat'ns.
October 24th	12	24	2	2	2
November 7th	12	24	..	..	6
" 12th	12	24	..	..	2
" 19th	12	24	..	..	4
" 25th	6	12	..	..	4
December 5th	12	24	1	..	6
" 19th	6	12	1	..	..
" 26th	6	12	1	1	..
" 31st	12	24	1	3	..
January 6th	10	20	4	3	2
February 5th	12	24	..	1	..
Total	112	224	10	10	26
Net total	107	(In five cases both animals were lost or died.)			

TABLE II.—DATA OF TUBERCULOUS MILK SPECIMENS.

Date.	Tuberculous Specimens.	Cream or Sediment.	Bacteria per c.c.	Wholesaler.	Wholesalers who Sell also Bottl'd Milk.
Oct. 24th....	1	Sediment *	390,000	A	0
Nov. 7th ...	1	Sediment	4,800,000	B	1
	1	Cream and sediment	80,000	C	1
Nov. 12th ...	1	Cream	170,000	W	1
	1	Cream and sediment	90,000	W	1
Nov. 19th ...	1	Cream and sediment	80,000	E	1
	1	Cream and sediment	..	B	1
Nov. 25th ...	0	..	..	..	..
Dec. 5th....	1	Sediment	50,000	O	0
	1	Cream	1,400,000	G	1
	1	Cream and sediment	20,000	B	1
	1	Cream	60,000	B	1
	1	Sediment*	..	B	1
Dec. 31st	1	Sediment*	..	E	1
	1	Cream and sediment	8,000,000	H	0
	1	Cream*	230,000	B	1
Jan. 6th.....	1	Cream and sediment	160,000	J	1
	1	Cream and sediment	180,000	J	1
	1	Cream*	60,000	J	1
	1	Cream and sediment	..	J	1
Feb. 5th.....	0	..	..	..	..
	19 (17,	excluding duplicates.)			

TABLE III.—DATA OF INTRAVENOUS INOCULATION OF RABBITS WITH PURE CULTURES OF TUBERCLE BACILLI.

	Total Age of Culture.	Number of Transfer.	Age of Culture.	Amount Inoculated.	Number of Rabbit.	Result.	Remarks.
Culture I.	82 days	3d	22 days	0.5 c.c.	320	Chlo'form 21 days (ill)	General tuberculosis.
Culture II.	95 days	4th	20 days	0.5 c.c.	321	Died 18 days	" "
Culture III.	76 days	3d	25 days	0.5 c.c.	325	Died 16 days	" "
Culture IV.	67 days	3d	28 days	0.4 c.c.	326	Died 20 days	" "
Culture V.	98 days	4th	21 days	0.5 c.c.	327	Died 23 days	" "
Culture VI.	79 days	3d	30 days	0.5 c.c.	331	Chlor.17 days	" "
Culture VII.	69 days	3d	26 days	0.5 c.c.	332	Died 15 days	" "

LITERATURE.

1. Anderson: Hygienic Laboratory Bulletin No. 41.
2. Ostertag: Untersuch. über die klinische u. bakt. Feststellung der Tuberk. des Rindes, 1905.
3. Hess: "Tuberculosis of the Tonsil," Archives of Pediatrics, August, 1907. "Tuberculosis of the Mesenteric Glands," Am. Journ. Med. Sci., August, 1908.
4. Rabinowitsch and Kempner: Zeitsch. Hyg., xxxi, 1899.
5. MacFadyean: Lancet, vol. ii, 1899.

* Animal inoculated with other part of milk lost or died.

Estudio del Contagio por la Leche en la Ciudad de New York.—(HESS.)

Para esta investigación se usó "leche suelta," es decir la leche que se detalla en cargas. En muchos casos esta es la misma que la embotellada. En cada prueba se emplearon diez centímetros cúbicos de leche. Esta se centrifugaba y como 1 c.c. de crema y la bajisma c.c. de leche era inoculada á un conejo de Indias, usandose en todas dos conejos para cada prueba. Las inoculaciones se hicieron intramusculares y subcutáneas. De 107 especimen probados de este modo, 17 ó el 16% presentó tuberculosis. Como la tuberculosis del ganado es comunicable al hombre, especialmente á los niños, esta condición del mercado de la leche es una amenaza á salud pública.

De ocho pruebas realizadas de manera semejante con "leche comercial pasteurizada uno contenía bacilo tuberculoso virulento. Este resultado demuestra que en la práctica la llamada comercial pasteurización no merece confianza por protección. Si la leche no proviene de vacas probadas por la tuberculina, debo ser suficientemente pasteurizada ó hervida.

Se aislaron de la leche algunas culturas de bacilo tuberculoso. En varios casos probó ser del tipo-bovino segun su morfología, manena de crecer y virulencia en los conejos. Este no uniformidad debe considerarse como una evidencia más de la constancia del bacilo tuberculoso bovino.

DISCUSSION.

DR. MAGILL (New York): I wish to mention some experiments of my own, which in the light of Dr. Hess' investigation open a subject for your earnest reflection.

Some years ago I made a similar examination of the milk-supply of Paris, and found the tubercular contamination to be about 12 per cent. of such milk. In 1901 I made a similar series of examinations of the milk of New York city, and found from 10 to 11 per cent. of such milk contaminated with tubercle bacilli. Both of these milk-supplies at the time of my examination were not subject to any special regulations to protect from tubercular contamination. For some years the Board of Health of New York City has very widely proclaimed its efficient system of inspection, tuberculin testing, and similar sanitary control measures, pretending that in this manner it was efficiently guaranteeing the public against tubercular contaminated milk. The Health Commissioner of New York City repeatedly proclaimed this to the Board of Aldermen at least two years ago, and this has been widely and repeatedly declared by him in the daily papers. Note that my results show 12 per cent. in Paris and 11 per cent. in New York of tubercular contaminated milk when no efforts for protecting this milk were in operation.

Now, after at least two years of this publicly proclaimed efficient control of the New York City Board of Health, Dr. Hess shows you 16 per cent. of

the milk of that city to be contaminated with tubercle bacilli. What is the explanation?

Dr. Moore: I am not in a position to answer that question. There is a large number of inspectors sent out by the State Board of Health for the purpose of inspecting the dairies. These inspectors, I understand, rarely apply the tuberculin test. There are also milk inspectors of the State Department of Agriculture looking after the milk, largely from the standpoint of purity and fraud. These men make no tests of the herds with tuberculin. There are also inspectors in the employ of the milk companies who are trying to produce a good milk-supply, and I think in these cases the inspectors are veterinarians and not simply dairymen, and that they pick out a greater number of diseased animals than do the others. I cannot agree with the last speaker that all the milk which goes to New York city is from tuberculin-tested animals. There is a certified milk sold in New York city and there are a great many herds which are tuberculin tested, but this is not the rule. An effort is being made, and the spirit is growing, among the dairymen of New York—they are beginning to realize that they cannot afford to have tuberculosis in their herds. Through these agencies much energy is being manifested toward improving the conditions. There are also many dairymen trying to carry out the Bang system. There seems to be a movement to better the conditions generally, and while we all are anxious to show results, the progress is slow; yet when we stop to look back for one, two, or three years we can see that much progress has been made.

At the conclusion of this discussion the Section adjourned till half-past two o'clock.

SECTION VII.

Tuberculosis in Animals and Its Relations to Man.—(*Continued.*)

SECOND SESSION.

Tuesday afternoon, September 29, 1908.

CONTINUING THE DISCUSSION OF PREVALENCE AND ECONOMICS OF TUBERCULOSIS IN ANIMALS.

The Section was called to order by the President, Dr. Leonard Pearson, at half-past two o'clock.

BOVINE TUBERCULOSIS IN LOUISIANA AND SOME OTHER SOUTHERN STATES.

By W. H. Dalrymple, M.R.C.V.S.,
Louisiana State University and Experiment Stations.

The prevalence and extent of bovine tuberculosis in the southern States of North America seem to depend largely upon the condition and environment under which cattle exist; and also upon the predominance, or otherwise, of the improved breeds. Hence the factor of introduction of the modern well-developed dairy breeds especially would seem to play an important part in the up-keep of infection in the dairy sections, as it is in the latter we seem to find the largest percentage of tuberculous animals.

True, the genial climate of the southern States, permitting an almost continuous outdoor existence throughout the entire year, should afford ideal conditions for the maximum of healthfulness in our cattle, and to a considerable extent this is no doubt the case. But, of itself, it is not sufficient, of course, to prevent, although it evidently tends to curtail, the spread of infection when once it is introduced.

In the autumn of 1888, while experimenting with improved breeds of cattle at the North Louisiana Experiment Station, situated in a pine-hill section of the State, a pair of Holsteins and a pair of Jerseys were purchased from breeders in a neighboring State. In 1891 a pair of Devons and also a pair of Guernseys were bought, the former in a contiguous State, the latter in one considerably further north, viz., South Carolina. The only losses prior to about 1895, since the inauguration of these cattle experiments, were the two Devons, which, at the time, were considered to have succumbed to tick fever; and the original Holstein cow, from age and general debility. No suspicion whatever of tuberculosis attached to any of the deaths mentioned, nor could any of the symptoms be recalled as similar to those exhibited by any of the animals which later developed the disease, and which were destroyed and subjected to post-mortem examination.

The increase from the above-mentioned purchases gave the Experiment Station in 1895 a sufficient number of milking cows to justify the establishment of a small dairy upon strictly scientific lines. Accordingly, a stable, or barn, and a dairy building were erected and equipped in the most approved (at the time) manner. The stable had a concrete floor, plenty of light, airspace, and ventilation, and with a wide alley-way between the two rows of stalls. In fact, this stable was perhaps more in keeping with modern hygienic and sanitary requirements than any other similar structure in the State.

During the entire year the cows were confined in this building only while being milked and fed, the remainder of their time being spent in the open air.

In the late summer of 1896 the condition of one of the Jerseys (a three-year-old) attracted the attention of the director by her gradual emaciation for several weeks previous to this time, and he at once suspected tuberculosis. An investigation was then made of the entire herd, numbering 22 animals, including 5 calves under one year old. The tuberculin test was employed, and 6 out of the 22 head responded, or almost 28 per cent. All of the reacting animals were ultimately destroyed, and the diagnosis was verified in each instance.

Although perhaps not quite germane to the topic under consideration, it might be of interest to note the effect of the tuberculin on some of the animals tested, as there is at present, it would seem, a good deal of discussion on this point:

The Jersey cow which first aroused suspicion, and which was the only one destroyed at the time, she being in a very much emaciated condition, had the same maximum temperature (103°) before as she had after injection with tuberculin, and yet on post-mortem was found to be bordering on the last stage of generalized tuberculosis, which frequently happens in advanced but apparent cases.

In the case of a three-year-old grade Jersey cow, which was within two months of calving, the rise of temperature after, above the average before injection, reached only nine-tenths of one degree, showing that the normal temperature was not appreciably disturbed by the administration of the tuberculin.

In the case of a seven-year-old Holstein cow, which was in estrum at the time of injection, the administration of the tuberculin did not seem to have any marked effect. In fact, the maximum temperature after (101.2°) was lower by eight-tenths of a degree.

There is quite a difference, also, in the time at which different animals show the highest temperature after injection with tuberculin:

A four-year-old Devon cow registered her highest temperature (105.4°) at the tenth hour after injection, and showed the same temperature at the twelfth hour.

A nine-year-old Jersey cow registered her maximum temperature (104°) at the twelfth hour; a five-year-old Jersey cow was highest at the fourteenth hour; a ten-year-old Holstein bull gave his maximum (105.1°) at the eighteenth hour; while a nine-year-old Jersey bull and a nine-year-old Guernsey cow registered, respectively, 103.6° and 104.4°, their maximum temperatures, at the nineteenth hour after injection. It might be stated that this Jersey bull's maximum, viz., 103.6°, may be considered low for a tuberculous animal, but his average before injection only reached 100.3°, which gave a reaction of 3.3°.

With the exception of the Jersey cow, which had generalized tuberculosis and was destroyed, not one of the rest of the reacting animals showed any physical evidences whatever of the disease. These cattle were isolated and again tested, and upon reacting a second time were destroyed, and a post-mortem examination made on each, with positive results.

In this way the diseased animals were ultimately got rid of, and the stable thoroughly disinfected. The latter was accomplished by the removal and destruction by fire of all inexpensive woodwork, such as mangers, etc. The entire inside of the building was then flushed with hot water to soften all old whitewash, some of which was much soiled with splashed ordure from the animals, and this was removed by means of scrapers, such as are used on shipboard, and trowels, until the woodwork had the appearance of new wood; and the concrete floor having undergone similar treatment, was left as clean as it was possible to make it. All of the detached refuse was subjected to thorough disinfection.

After a second complete flushing, and the woodwork, stalls, etc., allowed to dry, a disinfectant spray of bichlorid of mercury (1:500) was employed by means of a knapsack spray-pump to saturate everything within the building. After this had dried sufficiently, a final application of a mixture

of lime-wash and one of the commercial coal-tar products (5 per cent.) was made to the entire inside of the stable, and the latter was afterward left open to sunlight and air, and left unoccupied for a period of sixty days.

In the mean time the most of the remainder of the herd, which were sound, had been disposed of, and afterward some fresh purchases made, but since the reoccupancy of this previously infected stable, which is now at least ten years ago, a case of tuberculosis has not been suspected among the cattle of this particular experiment station.

Just how the disease originated in this herd it is difficult to say. It may, probably it must, have been introduced in some of the purchases mentioned. If so, however, it had remained in latent form for a considerable period of time, as there was at least an interval of five years between the last purchase of pure-bred animals from outside the State and the cow mentioned which aroused suspicion, and which was the first case of indisposition that had exhibited symptoms of tuberculosis.

Although, in this age of advancement in research work, opinions, to be worth anything, must be based upon accurate scientific data, it may be incidentally mentioned, as a point of interest and for what it is worth, that one of the employees on the experiment station had died of an acute attack of tuberculosis some time previous to the disease having been suspected in the dairy herd.

This man's special occupation did not lead him into direct contact with the cows, but his headquarters were within a few yards of the stable, and he spent a good deal of his unoccupied time with the dairymen and among the cows. We venture upon the interrogatory here, although we do so with "fear and trembling" before such an intelligent body—many for, some against, perhaps, the theory of intercommunicability: Could there possibly be any connection between the cases?—which, of course, opens up the question of the unity or duality of the tubercle bacillus. A positive statement in the particular case cited could not, of course, be made. No other cases of the disease in human beings, however, had previously been known among the employees of the experiment station.

The description of the outbreak in the experiment station herd, which I have gone into rather at length, goes to verify, in a measure, at least, what I have already stated, viz., that even our genial southern climate and outdoor conditions, and with more or less modern stable buildings and equipment, although they may be much more desirable than the conditions and environment found in colder latitudes, where animals have to spend so much of their time confined indoors; and are, or ought to be, more conducive to general healthfulness and vigor, cannot stay the ravages of the disease in the absence of supplementary methods of amelioration. But the outdoor life itself must of necessity be a most important factor in aiding physical resis-

tance on the part of the animal economy. On the other hand, the native or "scrub" cattle of the south, which are permitted to lead a more or less nomadic existence, are singularly free from tuberculosis. It is possible that the commercial dairy herds of the large southern cities, whose liberty is limited, in many instances, to filthy stables, and equally unsanitary yards, will show as high a percentage of infection as herds similarly situated, or even in country herds, in the colder or other sections of the country, which have enforced confinement during a considerable portion of the year.

Owing to other pressing duties and lack of sufficient time it has been difficult for me to obtain the amount of accurate data I should have liked on the subject of this paper, to present at this time. I was able, however, to secure a few straggling items, which I have tried to whip into shape, and that may be of interest.

The late assistant veterinarian of the Louisiana Experiment Stations, Dr. H. J. Milks, who had distributed to veterinarians throughout the southern States a list of questions on this particular subject in order to secure data for a report he was about to prepare as a member of the Committee on Diseases of the American Veterinary Medical Association, very kindly permitted me the use, although quite late in the day, of what replies he had received, but which I am rather afraid are somewhat inadequate and meager to afford a full conception of the conditions. However, I will endeavor to use them as best I can. The questions are as follows, with the exception of one relating to swine:

1. Is tuberculosis prevalent in your State?
2. What is the percentage in dairy cattle? Other cattle?
3. Does the percentage seem larger where cows are stabled than where they are allowed to run at large?
4. Is the tuberculin test employed in your State, and to what extent?
5. What percentage of stabled cows have reacted? What percentage of unstabled?
6. Is the Bang method followed in your State, and with what success?
7. Have you any State law with regard to testing cows for tuberculosis?
8. Is the disease on the increase or decrease in your State?
9. Have you a law requiring animals to be tested before coming into your State?

Approximate Summary of Replies.

Arizona:

Tuberculosis not prevalent, or only very slight.

The disease practically unknown among the native range cattle.

The climatic conditions prevent the necessity for stabling.

The tuberculin test has been employed in suspects, and is frequently used by the territorial veterinarian in examining cattle.

The Bang method is not employed.

There is no territorial law requiring animals to be tested with tuberculin, but an inspection or certificate is required of all dairy and breeding cattle entering the territory.

Arkansas:

Tuberculosis is not prevalent.

Few dairy herds have been tested.

The disease seems to be rare in native cattle.

The percentage is larger where cows are stabled.

The tuberculin test is employed in suspects, or by request.

Tuberculosis to the extent of 60 per cent. has been found among the dairy herds of some of the charitable institutions of the State.

The Bang method is not employed.

There is no special law for tuberculosis in the State.

Not sufficient evidence to warrant a statement as to increase or decrease of the disease.

Animals are not required to undergo the test before entering the State.

Florida:

Tuberculosis is prevalent in dairy cattle in the State, the southern portion showing 9 per cent.; the middle, 10 per cent.; 100 miles north of the middle portion, 15 per cent.; and the northern portion, 25 per cent. These figures do not represent an average, however, over the entire State, but only a small portion.

The disease is prevalent in other cattle, although range animals are an unknown quantity.

Cattle are not stabled at any season of the year.

The tuberculin test is employed, but is not compulsory, except in the case of dairy herds supplying some cities, such as Tampa, with milk, and which have local ordinances.

The percentages already mentioned were for stabled cattle. There are no data for unstabled animals.

The Bang method is not used.

There is no State law requiring the employment of the test.

One correspondent states that he thinks the disease is on the increase, as no means are being employed to prevent it; while a Tampa correspondent mentions a decrease in that particular section.

Animals are not required to be tested before entering the State.

Kentucky:

Tuberculosis is prevalent in the State.

Animals (88 head) supplying milk to Lexington showed 29.1 per cent. reactions. Those in the neighborhood of Louisville showed about 30 per cent., while those tested around Covington have shown but slightly lower than 23.4 per cent. reactions.

Fifty per cent. of a herd in Lexington reacted. No data as to other cattle.

Stabled cattle show the greater percentage of the disease.

The test is used in suspects, or by request.

The cows tested in the neighborhood of Lexington were out-of-doors day and night in good weather.

The Bang method is not employed.

There is no State law compelling the use of tuberculin.

The disease is believed to be on the increase.

There is no law requiring imported animals to be tested.

Louisiana:

The disease prevails among dairy cattle in Louisiana. The data, as to percentage, is insufficient for the whole State, but has been high in the city of New Orleans especially.

Native and range cattle appear comparatively free from infection.

The tuberculin test is required under a newly revised sanitary code of the State.

The Bang method is required by said code, but where found impracticable, communities may adopt a modification, permitting segregation of reacting cows, showing no physical evidences of tuberculosis, on separate farms, the milk and meat to be sold under sanitary regulations.

Recent live-stock sanitary legislation, conferring plenary powers on a State Commission, will no doubt eventually require the testing with tuberculin of all breeding and dairy animals before entering the State.

With no special effort hitherto made to control infection, outside of the city of New Orleans, and possibly one or two of the smaller municipalities having meat and milk inspection ordinances, it is probable that the disease may be on the increase.

Mississippi:

The disease is prevalent among dairy cattle, possibly from 2 to 7 per cent.

No data with regard to other cattle.

The percentage is larger in stabled cows.

The test is only employed by some towns requiring it.

The Bang method is not employed.

The tuberculin test is not made compulsory by State law.

The disease is on the increase.

(I might add here that Mississippi has a live-stock sanitary law similar

to Louisiana, which gives their live-stock sanitary board plenary power, but which has not, as yet, evidently been employed with regard to tuberculosis.)

New Mexico:

The disease is prevalent in the Territory.

Estimated percentage in dairy cattle, 10; in other cattle, 1 to 2.

The percentage is larger in stabled animals.

The tuberculin test is employed to some extent in the Territory.

The Bang method is not followed.

There is no law requiring the use of the tuberculin test, either in cattle within the Territory or in imported animals.

The disease is thought to be on the increase.

North Carolina:

The correspondents were not familiar with the average conditions for the entire State.

The prevalence of the disease, within a radius of 100 miles of Charlotte, is not great. The average percentage is given as four-fifths of 1 (0.8).

Animals are only stabled during milking periods, and in winter only during very severe weather. The open-air existence is considered the chief factor in keeping down the percentage of reactions in the dairy cattle.

Cattle are tested by the State veterinarian on request. In cities or towns having dairy inspection laws or ordinances testing is compulsory.

The Bang method is not employed.

The State has the authority to control tuberculous cattle, but there is no State law compelling the test, unless the owner requests it.

The correspondent cannot offer an opinion as to the increase or decrease of the disease in the State. It is believed there is a State law requiring imported cattle to be tested.

Tennessee:

Tuberculosis is prevalent in the State.

Dairy cattle affected, about 10 per cent.; other cattle, about 1 per cent.

The percentage is larger where cows are stabled: 15 per cent. reactions in stabled animals; 2 per cent. in unstabled.

Private testing is employed to a limited extent.

The Bang method is not followed.

There are no State or municipal laws on the subject of bovine tuberculosis.

The disease is on the increase.

Texas:

About 40 per cent. of the herds in the neighborhood of the larger cities are infected, but the average percentage is low.

Dairy cattle show about 1.8 per cent. infection; other cattle, almost "nil."

Cattle are stabled only during milking periods.

About 2500 head of dairy cattle have been tested within the past year.

The Bang method is not employed.

There is no specific law requiring the test, but if the State Live-stock Sanitary Commission suspects tuberculosis, they have sufficient authority to test the herd or herds.

The disease is on the increase.

There is no law requiring imported animals to be tested.

West Virginia:

The disease is not very prevalent.

The correspondent could not state the relative percentage of the disease in dairy and other cattle. It is stated to be larger, however, in stabled than in unstabled animals.

Herds are tested by the State Board of Agriculture upon request of the owners.

The Bang method is not employed.

When animals are suspected by the consulting State veterinarian in making his annual dairy inspections, they are required to be tested.

The disease is said to be on the decrease.

All imported animals for breeding purposes are required to be tested.

Reducing the gist of these replies down to its final analysis, the following, it seems to me, are about the most reasonable conclusions to be arrived at, and inferences drawn from them:

1. That bovine tuberculosis is prevalent, and apparently on the increase in the southern States heard from.

2. That this prevalence and increase are almost wholly among stabled or, inferentially, dairy cattle.

3. That the native or unstabled cattle chiefly are practically free from infection, which is probably largely due to their open-air existence and lesser exposure to infection, and, possibly, to their greater natural resistance.

4. That the tuberculin test should be more universally employed in the south, and be made compulsory, especially in commercial dairy herds.

5. That the Bang method is worthy of more extended use, when practicable, as shown by the modification of it practised at the North Louisiana Experiment Station, and in its entirety in other parts of the country and in other countries.

6. That the several southern States should have laws passed in order to be able to deal effectively with bovine tuberculosis, both in animals within, and those imported into, each State.

7. That bovine tuberculosis may be eradicated from a herd when intelligent measures are adopted, both in connection with the animals themselves, and with the thorough disinfection of premises, and other necessary sanitary procedure, as shown by the results obtained in the dairy herd of the experiment station mentioned.

In reporting upon the outbreak of tuberculosis twelve years ago in the experiment station herd, I appended the following statement and recommendations:

"That as tuberculosis, or consumption, in cattle has been proved to exist in Louisiana, we would urgently recommend that no pure-bred or high-grade cattle should be imported without first having them tested, or obtaining a guarantee that they had been tested at a recent date (prior to purchase) with tuberculin."

"We would further recommend that owners of dairy stock, and especially vendors of milk, should, for their own benefit, both pecuniary and otherwise, and for the sake of the public health, have their cows tested with tuberculin at regular intervals. To be able to satisfy the mind of the public that he was disposing of milk from tested cows only, would be the finest advertisement a man in the business could have. And, as a benefactor to his race, in preventing the transmission of this terrible disease to numberless human beings, especially children, he would be deserving, and would be the recipient, of inexpressible thankfulness and gratitude at the hands of the public." And I am still of the opinion that the foregoing, so far as it goes, is just as applicable to-day as it was over a decade ago.

Tuberculose bovine dans la Louisiane et dans quelques autres États du Sud.—(DALRYMPLE.)

La propagation et l'étendue de la tuberculose bovine dans les États du Sud de l'Amerique du Nord semblent dépendre principalement des conditions et de l'entourage de la vie que mènent les bestiaux et de la prédominance, en d'autres mots, des améliorations de la race. De ce fait on peut déduire que l'introduction de vaches laitières de bonne race jouerait un rôle important en prévenant l'infection des sections des vaches laitières puisque c'est parmi ces dernières qu' on trouve ordinairement, le plus grand pourcentage d'animaux tuberculeux. Vraiment, le climat merveilleux des États du Sud, qui permet aux bestiaux de vivre presque continuellement en plein air pendant toute l'année devrait offrir à notre bétail des conditions ideales pour le maximum de santé et jusqu, à un certain point, il n'y a aucun doute que ce ne soit le cas. Il n'est pas suffisant, naturellement, pour prévenir la propagation de l'infection quand une fois, celle-ci a fait son ap-

parition, bien qu'il soit évident que ces conditions favorables tendent à en diminuer l'étendue et à en enrayer la marche.

Au début de l'automne de 1896, un troupeau de vingt-deux animaux comprenant cinq veaux au-dessous d'un an, ont été traités par la tuberculine à la Station experimentale de la Louisiane du Nord, et six des vingt-deux ont réagi, ou presque vingt cinq pour cent. Ceux, chez lesquels la réaction s'est manifestée, ont été triés dernièrement et le diagnostic offert par le traitement a été vérifié pour chaque cas. Sauf une vache de Jersey, atteinte de tuberculose généralisée, qui a été détruite immédiatement après le traitement, pas un des autres animaux n'ont montré un signe quelconque de la maladie.

Après la destruction définitive de tous les animaux qui avaient réagi l'étable a été complétement nettoyée et désinfectée, elle est restée ouverte et inoccupée pendant soixante jours. Depuis à temps, soit une période dan moins dix ans, il ne c'est produit aucun cas suspect parmi le troupeau de l'établissement. Aucun animal n'avait été introduit pendant un laps de temps de cinq ans, précédant l'investigation.

Tandis que la maladie est très repandue et qu'elle s'accroît peut être même, parmi les vaches laitières des États du Sud, les animaux indigènes ou scrub, sont singulièrement épargnés par la maladie, ceci est dû, très probablement, à leur existence nomade et en plein air, ils sont de ce fait, moins exposés à la maladie et y opposent plus de resistance.

Des rapports de douze États du Sud démontrent:

1. Que la tuberculose bovine est trés repandue et apparemment en augmentation.

2. Que l'extension et l'accroissement se manifestent plus exclusivement parmi les vaches laitières vivant dans les étables.

3. Que le bétail indigène celui qui vit en plein air, sans étable, n'est presque jamais infesté.

4. Que presque tous les États qui envoient leurs rapports, n'ont aucune législation pour combattre effectivement la tuberculose.

5. Que la methode Bang n'est exigée que par un code sanitaire nouvellement révisé de la Louisiane.

6. Que la minorité de ces États requiert le traitement de la tuberculine dans l'élevage des bestiaux avant leur arrivée dans l'État.

7. Que la tuberculose bovine peut être extirpée d'un troupeau si des mesures intelligentes sont prises pour les animaux eux-mêmes et pour la désinfection compléte des étables et d'autres procédés sanitaires comme le prouvent les résultats obtenus par le troupeau de vaches laitières de l'Etablissement d'expérience de la Louisiane du Nord.

DISSEMINATION OF TUBERCULOSIS AMONG ANIMALS IN ALABAMA.

By C. A. Cary,

State Veterinarian, Secretary of State Live Stock Sanitary Board, Auburn, Ala.

The death-rate from tuberculosis for the colored people is from two to seven times that of any other race, and the death-rate for the white people from the same disease is high enough to indicate the prevalent existence of that serious disease. The question naturally arises: How about tuberculosis in animals? Extensive and accurate statistics are wanting; yet a few records may give a relative idea of how the disease is propagated in the South among domestic animals. Up to the present time conditions, as a rule, have favored the non-extension of tuberculosis among animals.

1. The number of scrub and beef cattle and hogs in the south is relatively small. With the exception of Texas, the Gulf and South Atlantic States do not produce sufficient beef cattle and hogs for home consumption. The small number of widely scattered animals materially aids in preventing the spread of tuberculosis.

2. Most of these animals live in the open pastures or ranges; many are never confined in sheds or barns. This also helps to prevent the extension of tuberculosis.

3. On account of the high death-rate from tick fever, importation of beef cattle has been very limited. Hence, tuberculosis has been imported only in a very few cases.

4. With the exception of dairy cattle, the contact of animals with man, especially with the negro, is not close. This would practically eliminate transmission of tuberculosis from the frequently infected colored man to cattle.

5. Hogs rarely or never follow beef cattle in pens or feed lots.

6. There are few creameries in Alabama, and most dairies sell whole milk. Hence, hogs are not often fed skim milk.

7. Dairy cattle are exceptions to the preceding reasons for the non-extension of tuberculosis.

(*a*) They are more numerous than beef cattle.

(*b*) They are housed part the time each day.

(*c*) They are more numerously imported than beef cattle.

(*d*) They are in close contact with the white man and the negro.

(*e*) Calves are fed whole or skim milk and often two or more suck an old cow or one that has a spoiled udder.

Tuberculin tests are made annually of all dairy cattle that supply commercial milk to the public in the cities of Birmingham, Montgomery, and Mobile. In Montgomery tuberculin tests have been made for ten years, and while a few cases of tuberculosis have been found at different times in a number of herds, only one herd was found to be seriously infected. Out of 200 dairy cattle in that herd, 10 reacted to tuberculin in one year. In Mobile, out of one herd of 56 dairy cattle, 28 reacted to the tuberculin test.

Of all the distinctly dairy cattle that have been tested in Alabama in the past twelve years, these two herds were the only ones that were extensively infected.

In 1908, 82 head of cattle were tested on a farm in the Tennessee Valley of north Alabama. These cattle were pure-bred Angus, grade Angus, Holsteins, Jerseys, and scrubs. They were kept most of the time in pastures and fed at times in sheds and barns. The following shows in detail the results of the tuberculin tests:

Number of grade Angus tested	68	
Number of pure-bred Angus tested	7	
Number of Holsteins tested	3	
Number of scrubs and Jerseys tested	4	
Total number tested	82	
Number of grade Angus reacting to test	31	
Number of grade giving suspicious reaction	4	
Number of Jerseys reacting	2	
Number of pure-bred Angus reacting	2	(young)
Number of pure-bred Angus giving suspicious reaction	1	(young)
Number of Holsteins reacting	2	
Total giving positive and suspicious reactions	42	

None of the mature pure-bred Angus cattle reacted. The way the cattle were handled helped spread the infection. Several calves were permitted to suck old diseased milch-cows.

The history of this herd indicates that the original infection came from a Holstein bull that was brought from another State nine years previous to this time the cattle were tested. The fact that nearly 50 per cent. of the herd became infected largely by consuming infected milk

indicated that this disease may be quite rapidly disseminated in a herd in the south when no attempt is made to regulate the use of milk from infected cows. It is a common practice on some farms and at some dairies to permit two or more calves to suck an old cow that has one or more spoiled udders.

In the absence of extensive data the following tentative conclusions concerning tuberculosis of animals in the South may be shown:

1. The wide ranges and outdoor life of cattle tend to eliminate the transmission of the infection by moist infected nasal discharges or by infected fecal materials. Hence, scrub and beef cattle are rarely infected by tuberculosis.

2. Beef cattle are not finished in feeding pens on corn and are therefore never followed by hogs. Hence, hogs are rarely infected by tuberculosis.

3. The most common mode of transmission of tuberculosis among cattle in the south is by feeding young cattle on infected milk.

4. Hogs are very rarely kept and fed at dairies in the south.

5. How great a factor the tuberculous colored man is in the transmission of tuberculosis to cattle and hogs has not been determined.

6. Large pastures, frequent rains alternating with dry winds and sunny days, disinfect pastures and ranges that may be occasionally infected with feces containing tubercle bacilli.

7. Infected cattle, except those for immediate slaughter, must be tested with tuberculin before they can be shipped into Alabama.

CONTROL OF TUBERCULOSIS IN DOMESTIC ANIMALS IN PENNSYLVANIA.

By Louis A. Klein, V.M.D.,
Harrisburg, Pa.

The methods now in use in Pennsylvania for the control of tuberculosis in domestic animals have been developed since 1896, when the State Live-stock Sanitary Board was organized. These methods may be classified as follows: (1) Examination and tuberculin test at the request of owners of herds suspected of infection with tuberculosis. (2) Assisting owners in disposing of cattle that have reacted to private tuberculin tests. (3) Compulsory notification by practising veterinarians of cases in cattle of advanced or generalized tuberculosis or tuberculosis of the udder of which they may obtain knowledge. (4) Quarantining cattle affected with advanced or generalized tuberculosis or tuberculosis of the udder, and rendering assistance in disposing of such cattle. (5) Inspection and tuberculin test of dairy cows and cattle for breeding purposes shipped into Pennsylvania from other States. (6) Indemnification of butchers and others for cattle slaughtered for food and condemned on account of tuberculosis. (7) Coöperation with local boards of health in the inspection of dairy herds and the quarantine and disposal of cattle showing physical signs of tuberculosis. (8) Inspection of animals slaughtered for food and control of the sanitation of slaughter-houses. (9) Laboratory work.

Vaccination of cattle against tuberculosis is also being carried out on a number of farms, but this method is not as yet being generally applied. Information regarding tuberculosis is sent out in letters, circulars, and bulletins, and effective instruction in this line is also given by means of public post-mortem examinations of reacting cattle.

Dr. Leonard Pearson is the author of these various methods, and, as State Veterinarian and Secretary of the State Live-stock Sanitary Board since its organization, he has had charge of their execution.

1. *Examination and Tuberculin Test of Suspected Herds.*—This work is at present conducted under practically the same plan that was recommended to the Board by Dr. Pearson at its organization meeting in January, 1896. Certain details have been modified and new features have been added from

time to time to meet conditions as they arose, but the basic principle remains the same. This is the voluntary coöperation of the herd-owners. Looking backward, it appears that the plan was merely made to fit in with the circumstances, but it must not be forgotten that these circumstances had to be anticipated, and that when the plan was adopted tuberculin had only been known for five years, and there were so many different methods in use in the various States and in foreign countries for controlling tuberculosis in animals that there was no standard to follow. The principle of voluntary coöperation was based upon the conclusion that since it was necessary for the owner to observe certain precautions to prevent the reintroduction of tuberculosis into the herd, to appraise and remove the infected cattle without assurance of this coöperation would convert the work into a form of gratuitous live-stock insurance. The soundness of this conclusion has been proved again and again during the past twelve years.

The form of application in use at the present time is quite similar to the one first adopted. It contains a contract obligating the owner to dispose of the diseased cattle under the rules of the State Live-stock Sanitary Board; to thoroughly disinfect the premises and to correct any faulty sanitary conditions after the infected cattle are removed; to observe the precautions and employ the means recommended by the Board to prevent the reintroduction of the disease into the herd; to purchase for addition to the herd only such cows as have passed the tuberculin test, and if 20 per cent. of the herd reacts, to have a retest made at his own expense within eight months after the State inspection.

During the second year of the work applications became so numerous that it was not possible to make all the examinations requested, a condition that continues to this day; and since that time owners have also been required to state their reasons for believing that their herds are infected with tuberculosis, and an attempt has been made to examine those herds which appear most likely to be diseased. Not very long after the inauguration of the work applications had increased to four times the number of herd inspections that could be made with the money available, and numerous herds were being tested with tuberculin at owners' expense, a thing that was very rarely done before the State inspections were instituted. Applications for herd inspections have continued up to this time to be greatly in excess of the number of inspections that can be made. At no time since the beginning of this work have the resources of the State Live-stock Sanitary Board been sufficient to meet the demands of those who desired to coöperate with the State in the repression of tuberculosis in their herds.

The great increase in the number of applications is to be explained by the increase in knowledge of herd-owners and the general public regarding tuberculosis in cattle, and it is believed that no one thing did more to convince

cattle-owners of the economic reasons for repressing the disease in cattle than the policy of the State Live-stock Sanitary Board in arranging for them to witness post-mortem examinations of reacting cattle. When reacting cattle are to be destroyed on a farm, the farmers of the vicinity are afforded an opportunity to witness the post-mortem examinations, unless, as happens in some rare cases, the owner desires to avoid publicity, and it has been repeatedly observed that whenever cattle are disposed of under these conditions, a number of applications for herd inspections are received from the locality. In some cases when owners of infected herds have had no personal desire to apply for inspection, they have been led to do so by the public sentiment existing in their community or among the consumers of the products of the herd. Badly infected herds, when owners are uninterested, are usually brought to the attention of the Board by the operation of the law requiring notification of cases of advanced or generalized tuberculosis or tuberculosis of the udder, by neighbors or by local authorities.

When it is decided to make an inspection and tuberculin test of a herd, the work is assigned to a veterinarian practising in the locality, and a careful physical examination of each animal is made before the tuberculin test is applied. The tuberculin used in these tests is prepared in the laboratory of the Board. An examination is also made into the sanitary conditions of the premises and the herd hygiene. All cattle found to be tuberculous must be at once separated from the healthy animals, fed and cared for separately, and their milk not used for any purpose unless sterilized by boiling or pasteurized by heating for ten minutes at 165° F., until they are disposed of in accordance with the rules of the Board.

The owner has the choice of two methods of disposing of the tuberculous cattle: those not showing physical symptoms can be kept in quarantine under the Bang system, or all of the tuberculous cattle can be slaughtered. Professor Bang's method of repressing tuberculosis has not proved very popular in Pennsylvania. It has been adopted in only a very few instances. The reasons appear to be the restricted market for the heated milk and the extra work involved in maintaining two separate herds. When the owner elects to have the cattle slaughtered, they are appraised by an agent of the Board and the owner; but if no agreement can be reached by these two, which rarely happens, a board of appraisers is appointed: one by the owner, one by the State Live-stock Sanitary Board, and a third by these two. The law under which such cattle are appraised provides that not more than three-fourths of the actual value of the animal at the time of the appraisement can be allowed, and in no case can the amount exceed $25 for a grade or $50 for a registered animal. The appraisements for individual animals average from $22.25 to $23. After appraisement the cattle showing external symptoms of tuberculosis are destroyed, and the carcasses disposed of by burial

or cremation on the premises or through an approved fertilizer plant; the others are removed to a slaughter-house and killed under inspection, the carcasses being disposed of in accordance with the recognized principles of meat inspection. This latter practice is sometimes attended with difficulty in small towns, where butchers occasionally find it inadvisable to handle reacting cattle on account of the sentiment existing among their customers. Some meat consumers are very inconsistent in this respect. A butcher can buy a cow out of a herd, in the same locality, which is very likely in the same condition as the inspected herd, and slaughter it without inspection, and can sell the meat without objection; but if he buys cattle which have reacted to the tuberculin test, but which do not show any other symptoms of disease, and slaughters them under proper inspection, he may not only be unable to sell the meat, but may also gain the reputation of killing diseased animals. It is very gratifying to be able to state, however, that this inconsistency does not exist to the same extent that it did several years ago, and that it is fast diappearing as the knowledge of meat inspection and tuberculosis becomes more and more general.

After the tuberculous cattle are disposed of, the premises are thoroughly cleaned and disinfected under State supervision, and the owner is instructed with regard to the correction of any faulty sanitary conditions which may exist and the precautions to be observed to prevent the reintroduction of the disease into the herd. If more than 20 per cent. of the herd have reacted, a record is made of this fact, and the matter is followed up to see that a retest is made within the proper time.

Detailed statistics concerning this work for the last twelve years could be given, but they would only show the number of herds which it has been possible to examine with the resources at the command of the Board, and would furnish no exact information regarding the real value of this work to the live-stock interests of the commonwealth of Pennsylvania. However, in order to give an approximate idea of the cost of herd inspections I will append a few figures covering the last three years:

	Number Herds Inspected.	Number Infected Cattle.	Total Appraisement.	Expense of Inspection.
1905.....	773	1,352	$24,915.90	$4,589.59
1906.....	858	1.536	23,344.06	3,886.92
1907.....	878	1,819	20,232.40	3,670.59

The number of infected cattle given above does not indicate the extent to which tuberculosis exists in individual herds in Pennsylvania. These figures include the clinical cases disposed of during the year, and also those condemned in slaughter-houses on account of tuberculosis and for which

indemnity was paid. It must also be remembered that only the herds which were manifestly diseased were inspected and tested with tuberculin.

2. *Assisting Owners in Disposing of Cattle Found Tubercular on Private Examination and Test.*—Soon after the beginning of this work, herd-owners became so interested in repressing tuberculosis that when the Board could not comply with their application for an examination and tuberculin test, many of them had the examination and test made at their own expense. As early as 1897 a number of large herd-owners and dealers had arranged to sell cattle subject to the tuberculin test. These facts are cited to show the effect of the dissemination among cattle-owners of knowledge regarding tuberculosis.

In 1897, the second year after the inauguration of the work, it was decided to extend to owners having their cattle examined and tuberculin-tested at their own expense the same assistance in disposing of tubercular cattle as was extended in those cases where the examination and test were made by the State, and under the same conditions. This was done in order to extend assistance in repressing the disease to as many herd-owners as possible, and also to discourage unscrupulous persons from disposing of reacting cattle to unsuspecting purchasers. So many private tests were made that the demands for this assistance soon became so numerous as to overtax the resources of the Board, and at the present time a large number of herds are being examined and the tuberculous cattle disposed of in this way.

3. *Compulsory Notification of Clinical Cases.*—Since 1905 practitioners of veterinary medicine have been required by law to report to the State Live-stock Sanitary Board all cases of advanced or generalized tuberculosis or tuberculosis of the udder of which they may obtain knowledge. Upon receipt of such a report authority is issued to an agent of the Board to appraise the affected animal, and if the owner will agree to the appraisement and will sign the contract described above, to have it destroyed and the carcass properly disposed of. The premises are then cleaned and disinfected and any faulty sanitary conditions corrected. If the owner refuses to dispose of the animal under these conditions, it is placed in quarantine and the use of the milk forbidden unless it is sterilized or properly pasteurized. Such refusal on the part of the owner, however, is very rare, because in most instances the case is brought to the attention of the veterinarian by the owner himself.

4. *Quarantine of Advanced Cases and of Cows with Tuberculous Udders.*—Cattle affected with advanced or generalized tuberculosis or with tuberculosis of the udder are a far greater menace to the herd and to the public than those animals in which the existence of the disease can be detected only by the tuberculin test, and for this reason every effort is made to locate such cattle and to reduce or abolish the dangers resulting from their existence. As already stated, many such animals are reported to the Board by veteri-

narians, but perhaps an equal number are reported directly by the owners. In some instances the reports come from neighbors or from local health officials. Frequently, reports from the latter sources are discovered to be unfounded, but a sufficient number of dangerously diseased cattle are found to justify an investigation of all such reports. The detection and quarantine or destruction of such animals not only remove fruitful sources of infection from individual herds, but also prevent the use of the milk of such cattle except under proper conditions, and make it impossible for them to be sold into other herds or to be slaughtered for beef.

5. *Inspection of Cattle Imported from Other States.*—At the beginning of this work it was recognized that the plans for the repression of tuberculosis within the State would be more or less vitiated if cattle were permitted to be shipped into the State without any regard to their condition as to health. Tuberculosis had been found to be most prevalent in the old dairy districts of the State which obtained their supply of cattle from outside sources. Counties in the interior of the State which raised a sufficient number of cattle to meet local demands, or in excess of this demand, and into which cattle from outside the State were rarely, if ever, shipped, were comparatively free from the disease. Several of the New England States had laws requiring that the tuberculin test be applied to cattle shipped from other States, and there was every reason to believe that cattle which did not pass the test would be sent into those States having no requirements. There was also positive knowledge of herds in other States being secretly tested and dispersed on account of extensive tubercular infection, the cattle being sold to dealers to be shipped a comfortable distance and sold to unsuspecting parties. A number of such shipments were made into Pennsylvania. With the State paying an indemnity for tuberculous cattle, there was also the possibility of cattle known to be diseased being purchased for a small sum in other States and shipped into Pennsylvania to obtain this indemnity. Cattle-dealers from other States had repeatedly tried to purchase reacting cattle from farmers in Pennsylvania, and it was not unreasonable to suspect that the same thing would be attempted in other States, and that if the farmer was not allowed an indemnity by his State, the sale was more likely to be made. Moreover, tuberculosis had been officially reported in all of the States from which cattle were being shipped into Pennsylvania, and in some of them it was quite prevalent.

Consequently a law was passed by the legislature in 1897, and became effective on January 1, 1898, regulating the shipment of dairy cows and cattle for breeding purposes from other States into Pennsylvania. Under this law the cattle are required to be inspected and tested with tuberculin either before shipment, at suitable stock-yards nearest the State line on the railroad over which they are shipped, or after their arrival

at destination. If the cattle are inspected outside of Pennsylvania, the law requires that the inspection must be made by an inspector who has been certified to be competent and reliable by the official in charge of the live-stock sanitary work in his State; if the inspection is made within the State, it must be made by an inspector approved by the State Live-stock Sanitary Board. If it is desired to have the cattle inspected after their arrival at destination, a permit to make the shipment must first be obtained from the Board. These permits authorize the cattle to be shipped in quarantine, and it is required that after their arrival at destination they shall be kept separate and apart from other cattle, that the milk shall not be sold or used without previous sterilization by boiling, and that they shall remain in the custody of the shipper until they have been examined and tested with tuberculin and pronounced to be free from disease by an approved inspector. These inspections are made at the expense of the owner, but the tuberculin is supplied by the Board. Tags, which are lettered and numbered serially, are also supplied for marking cattle which pass inspection. The inspector is required to give a full report of the tuberculin test, the conditions under which it was made, the physical condition of the animals, and the letter and number of the tag attached to each animal in his certificate, and he must also make affidavit to the statements. Any cattle found to be tuberculous are placed in quarantine and, if the owner wishes, can be slaughtered for beef under inspection. Formerly, upon application of the owner, a permit was issued to ship such animals back to the point of origin, and notice was given of the shipment to the live-stock sanitary authorities of the State whence they came, but since last November, when the Secretary of the United States Department of Agriculture issued an order forbidding the interstate movement of cattle and swine affected with tuberculosis, no such permits have been issued. Animals giving an indefinite reaction are placed in quarantine for a retest, which is usually made at the end of three weeks.

Since this law went into operation herd-owners applying for tuberculin tests, or for assistance in disposing of cattle which have reacted to a private test, have been required to certify that there are no animals in the herd which have been brought into Pennsylvania from another State without inspection and tuberculin test since January, 1898.

This law has been found to work quite satisfactorily. It has met with little opposition from shippers, and it has caused dealers to use all possible care in purchasing cattle for shipment into the State. Since it has been in operation cattle have not been purchased in such large numbers as formerly in those districts where tuberculosis is most prevalent; but while shipments from these districts have decreased, there has been a relative increase in shipments from other localities, so that there has been no effect on the total

number of shipments. Tagged cows have come to have a distinct market advantage in many sections of the State. In one shipment of 20 head from a neighboring State inspected last week 11 cows reacted. It is a common custom for milk-cows to be shipped into Pennsylvania in car-load lots and sold at public sale to individual buyers. The damage resulting from infected animals in such shipments would therefore be more wide-spread than if all the cattle went into one herd.

The lack of official supervision of inspections made outside of Pennsylvania has led to some unsatisfactory results. Some control over these inspections is given to the Board by the provision requiring that the inspector must obtain a certificate as to his competency and reliability from the live-stock sanitary authorities of the State from which the cattle are shipped. This affords protection from incompetent and untrustworthy men when proper care is exercised in issuing such certificates. But even a capable and conscientious veterinarian, employed by a man who is perhaps one of his regular clients, to examine and tuberculin-test cattle to be shipped to a stranger in another State, is not unlikely to look at the proceedings from the standpoint of the seller, and to decide in his favor any doubts regarding the condition of the cattle. It would be much more satisfactory could these inspections be made by inspectors appointed by the live-stock sanitary authorities of the State, and who had been given to understand that their continued employment in such work was entirely contingent upon the inspection being carefully and properly made. The expense of such a system of inspection would be exceedingly slight compared with the benefits resulting to those States producing cattle in excess of their needs. It would attract buyers from other States and would thus be a distinct advantage to herd-owners with cattle to sell; it would also afford the live-stock sanitary authorities a means of obtaining information concerning the location and extent of tuberculous infection, and, most important of all, it would insure a proper disposition of reacting cattle. Under the present conditions we have no knowledge or control over the cattle that react to the tests made outside of the State.

6. *Indemnification for Cattle Condemned as Unsuitable for Food on Account of Tuberculosis.*—Considerable assistance in the control of tuberculosis is afforded by a law passed by the legislature in 1903, which authorizes the payment of an indemnity to butchers, or others, for cattle slaughtered for beef and found to be unsuitable for food on account of tuberculosis. The effect of this law is to encourage the removal of suspected animals from a herd, and their slaughter for beef under proper inspection rather than their sale to another herd-owner; furthermore, it encourages butchers to request inspection of diseased carcasses and prevents diseased meat from going into the market. Sausage in various forms is extensively manufactured by the small butchers in Pennsylvania, and cows find a ready sale for this reason.

Before any indemnity is paid for condemned carcasses under this law, the butcher, or the owner of the animal at the time of slaughter, is required to submit a statement of claim containing a certificate of inspection, condemnation, and valuation signed by the inspector, and a statement showing that the animal has been continuously in the State for at least four months previous to the time of slaughter. All statements regarding ownership must be sworn to and the butcher or the last owner must also state the amount paid for the animal. The amount of the appraisement in such cases cannot exceed five cents per pound nor more than $25 for a carcass.

7. *Dairy Inspection.*—The inspection of dairy herds in coöperation with local boards of health affords another means of discovering cattle in which the disease is manifested by physical signs, and enables the Board to arrange for the proper disposal of these dangerous cases. The use of the milk from such cattle without sterilization or pasteurization is also prohibited.

8. *Inspection of Animals Slaughtered for Food and Control of Slaughter-house Sanitation.*—The State Meat Hygiene Service, while designed primarily to insure a wholesome meat-supply, also assists in the control of tuberculosis in animals, as well as of other diseases, by causing diseased carcasses and organs to be rendered or destroyed. In the course of this work it has been discovered that the feeding of tuberculous flesh and organs in the raw state to swine has been a prolific source of tuberculosis in these animals. In one lot of 48 hogs which had been fed on offal and other slaughter-house refuse in the raw state, 9 died, and when the other 39 were slaughtered under inspection it was found that all but one were affected with tuberculosis, and in 16 the disease was extensive and generalized. The custom followed in forbidding the use of milk from cows found to be tuberculous unless it is pasteurized or sterilized has also assisted in preventing the dissemination of the infection among swine as well as calves.

9. *Laboratory Work.*—The preparation of the tuberculin used in this work in the laboratory of the Board has not only supplied a tuberculin of known strength, but has also made it possible for the Board to supply tuberculin free of charge to practising veterinarians for testing cattle at owners' expense, and has afforded an opportunity for the supervision of the disposition of cattle reacting to such tests. This laboratory has also further assisted in this work by providing facilities for the investigation of various questions connected with the biology of the tubercle bacillus, the channels of infection, the relation of bovine tuberculosis to human tuberculosis, and other scientific problems of practical importance in the control of the disease. It also furnishes facilities for testing other tuberculins, the preparation of vaccine, etc. Indirectly the laboratory has also been of great benefit in obtaining for the Board the support and confidence of the public in general by its general scientific investigations, while it has gained the support and approval

of veterinarians by placing its facilities at their command in the diagnosis of obscure cases of disease.

It should not be concluded, from the efforts made in Pennsylvania to control tuberculosis in cattle, that the disease was more prevalent in this State at the time this work was instituted than in other States with large dairy districts and receiving their supply of cows from other localities. As has been stated, portions of the State where cattle were raised in sufficient numbers to meet local needs and into which few cattle were shipped were entirely free from the disease.

There are no statistics available to show the number of tuberculous cattle in the State when this work was begun, nor do we know the exact number of tubercular cattle in the State at this time. Consequently, it is not possible to tell by comparison exactly what has been accomplished. But slaughter-house inspections, observations by veterinarians on herds within the circle of their practice, and information from herd-owners and cattle-dealers furnish strong circumstantial evidence that the number of infected herds in Pennsylvania has been considerably reduced and that the prevalence of tuberculosis in infected herds has been still more diminished.

BOVINE TUBERCULOSIS UNDER RANGE CONDITIONS.

By M. E. Knowles, D.V.S.,
State Veterinarian, Helena, Mont.

During the past sixteen years, constantly seeing thousands of range cattle, under all conditions, winter and summer, although constantly looking for it, I have been unable to find one single animal showing, under strict range conditions, clinical evidence of tuberculosis, and the Federal abattoir reports show an infinitesimal number of range cattle with lesions on autopsy.

Cattle in Montana are "run" under three systems: absolute, or strict open range; partial range and partial pasture, with shed feeding during winter, and close domestication, where the cattle are always under fence and shed or stable.

Under both of the last named we find occasional centers of infection, with usually a small per cent. of affected animals, the number affected being dependent upon local conditions, usually under semi-range conditions; the cattle being fed during the winter months in corrals, with sheds for shelter, where there is abundance of shed room, with protection on three sides only. Under this arrangement the number of affected animals in a herd (ordinarily consisting of from 300 to 1000 cattle) will be relatively small—5 or 6 per cent.; but where the shelter provided is inclosed on all sides, although the cattle are fed in an open lot or corral, only using the sheds during the night and in stormy weather, the percentage of infection is usually large—in fact, nearly as great as though under close domestication and indifferent sanitation.

The ordinary cattle-shed in our western country is cleaned but once yearly, and has no designed ventilation provided, the cracks and openings dependent upon indifferent construction being regarded as sufficient ventilation.

Although it is rare, indeed, to see a closely built cattle-shed in the west, to the casual observer the loosely constructed one having large cracks,

knot-holes, and an occasional board off would seem to possess sufficient ventilation. When such sheds are closely packed with cattle at night or during stormy weather, the atmosphere within them is vile, thick, and moist, and in the coldest weather the cattle will be covered with moisture condensed from vitiated respiration.

Thus do a large number of infections occur among so-called range cattle; but how different are these conditions from those of strictly range animals, where, from the time they are turned out on the open range until they are rounded up for shipment to the shambles, they never see the inside of a building and rarely even a structure of any sort, other than nature provides.

My observation justifies the assertion that tuberculosis of cattle cannot exist under open range conditions, strictly speaking, especially in a high dry altitude, such as we have in Montana, where sunshine, the greatest of bacteria destroyers, is more abundant than it is in Egypt.

It is possible at low altitudes, subject to greater precipitation, profuse vegetation, and shade-providing foliage, that tuberculosis, being introduced, might persist and perpetuate itself. But even under these conditions, range sanitation nature provides is so salubrious, and conditions are so different from those of semi- or close domestication, so unpromising of filthy conditions, that the disease could not possibly make serious progress.

During the two years, 1903–04, that Montana's Meat and Milk Inspection Law was enforced, the dairy cattle of each county were tuberculin tested. Four of these have, during years past, drawn heavily on eastern States for dairy cattle, all the others obtaining their dairy herds from range cattle. Not a single cow reacted in these counties, while those with eastern dairy cattle constituting the majority of the herds, or having been the foundation of them, gave from 18 to 30 per cent. of reactions.

What better proof could be offered of the freedom of range cattle from tuberculosis? And what better supportive evidence of the wisdom of the modern treatment of tuberculosis in man could be adduced than the evident freedom from this disease of animals living under perfectly natural conditions?

Tuberkulose unter halbwildem Herdenvieh.—(KNOWLES.)

Während der verflossenen 16 Jahre habe ich fortwährend Tausende von halbwildem Vieh, unter allen Bedingungen, Winters und Sommers, gesehen, und obwohl ständig darnach suchend, war ich nicht im Stande auch nur ein einziges Tier zu finden, welches, streng im Freien gehalten, klinische

Zeichen von Tuberkulose geboten hatte; und die Bundesberichte der Schlachthäuser zeigen eine ausserordentlich kleine Zahl von halbwildem Vieh mit Verletzungen bei der Autopsie. Das Rindvieh in Montana wird nach drei Systemen aufgezogen. Absolut oder durchgehend im Freien, teils im Freien und teils auf der Weide, mit Schuppenfütterung während des Winters, und ausgesprochene Hauszucht, wo das Rindvieh fortwährend innerhalb des Zaunes, in Schuppen oder Stall ist.

Unter den beiden letztgenannten finden wir mitunter Infektionsherde mit für gewöhnlich nur einem kleinen Prozentsatze befallener Tiere, deren Anzahl von örtlichen Bedingungen abhängt; für gewöhnlich, wenn das Vieh teilweise im Freien untergebracht ist. Das Vieh wird während des Winters in Corralen gefüttert, in Schuppen zum Schutze gegen das Wetter, die genügend Raum bieten, und nur nach drei Seiten hin geschützt sind. Bei dieser Anordnung wird die Anzahl befallener Tiere in einer Herde (eine Herde besteht aus 300 bis 1000 Stück) relativ klein—5 oder 6 Prozent—sein. Wo aber an drei Seiten geschützte Schuppen vorgesehen sind, wird, selbst wenn das Vieh daselbst während der Nacht und in stürmischem Wetter sich aufhält, der Prozentsatz der Infektion für gewöhnlich grösser sein; tatsächlich beinahe so gross als unter enger Hauszucht und ungenügenden sanitären Bedingungen.

Der gewöhnliche Viehschuppen in unserem Westen wird nur einmal im Jahre gereinigt, und hat keine richtige Ventilation vorgesehen, da die Fenster und Türen ungenügend konstruirt, als genügende Ventilation angesehen werden, obwohl es wirklich selten vorkommt, dass man einen anständig gebauten Rinderschuppen sieht, und dem zufälligen Beobachter der locker zusammengefügte, grosse Spalten und Astlöcher habende, dem auch hier und da ein Brett fehlt, als mit genügender Ventilation versehen erscheint. Wenn solche Schuppen während der Nacht oder stürmischen Wetters mit Vieh voll gestopft sind, ist die Luft darin ungesund, dick und feucht, und im kältesten Wetter wird das Vieh mit einem durch die verdorbene Respiration hervorgerufenen Feuchtigkeitsniederschlage bedeckt sein—daher kommt eine grosse Anzahl von Infektionen unter dieserart aufgezogenem Vieh vor. Wie anders aber verhalten sich diese Bedingungen zu jenen, unter welchen das wildaufwachsende Vieh von der Zeit an, da es auf die Weide getrieben wurde, bis es zur Verfrachtung nach der Schlachtbank kommt, nie die Innenseite eines Gebäudes und überhaupt eines Gebildes von Menschenhand gesehen hat. Meine Beobachtungen rechtfertigen die Behauptung, dass Rindertuberkulose nicht existieren kann, wenn das Vieh halbwild aufwächst, genau gesprochen besonders in einer trockenen Höhenlage, wie wir sie in Montana haben, wo mehr Sonnenschein als grösster Bakterienzerstörer in Überfluss vorhanden ist, mehr als in Egypten. Es ist möglich, dass in Niederungen die grösseren Niederschläge, dichtere

Vegetation und die Anwesenheit von vielschattigen Bäumen eher die Möglichkeit tuberkulöser Verbreitung und eines Bestehens der Krankheit zur Folge hat. Aber selbst unter diesen Bedingungen sind die entgegenwirkenden Kräfte der Natur so ausserordentlich wirksam und verschieden von den Bedingungen der Stallaufzucht, dass die Krankheit keinen ernstlichen möglichen Fortschritt machen kann.

Während der zwei Jahre 1903 und 1904, in denen das Fleisch- und Milchbeschau-Gesetz in Montana strengstens durchgeführt war, wurden die Viehherden jeder Grafschaft mit Tuberkulin untersucht. Vier von diesen haben während der verflossenen Jahre ihr Vieh hauptsächlich aus östlichen Staaten bezogen, während die anderen ihre Herden aus halbwildem Vieh erhalten haben. In diesen Grafschaften reagierte nicht eine einzige Kuh, während jene, in welchen Vieh aus dem Osten den grössten Teil oder den Grundstock bildete, 18 bis 30 Prozent Reaktionen zeigten.

Welcher bessere Beweis könnte für das Freisein des wildaufwachsenden Viehs von Tuberkulose gegeben werden? und welche bessere unterstützende Kenntnis in der Behandlung der menschlichen Tuberkulose könnte von der Tatsache abgeleitet werden, dass Tiere, die unter strengstens natürlichen Bedingungen leben, von dieser Krankheit verschont sind?

TUBERCULOSIS IN RANGE CATTLE IN CALIFORNIA.

By George S. Baker,
San Francisco, Cal.

The impression is very wide-spread that an active outdoor life will not only prevent, but cure, tuberculosis both in the human and the bovine. This is true only so far as there is freedom from infection. The amount of tuberculosis in range cattle reaching the abattoirs at this point proves conclusively that outdoor life alone is not sufficient to either prevent or bring about a cure.

My attention was first directed to this in 1900, when in conducting post-mortem examinations of a bunch of steers I found 0.9 of 1 per cent. showing tubercular lesion. Careful records were kept of this range—hereafter known as Range 1—till April 18, 1906, when, unfortunately, they were destroyed by the fire, but these records showed a constant increase in tuberculosis, until at the end of 1905 we were getting over 9 per cent. tubercular.

From April 18th to the end of 1906 there were killed, from Range 1, 1844 cattle (bulls, steers, and cows), with 203 tubercular.

In 1907—from Range 1—1288 steers, 62 showing lesions of tuberculosis. From other ranges in the State, 5382 cattle of all kinds, with 181 tubercular. From Nevada ranges, 433 cattle, 13 tubercular.

In 1908, January 1st to June 30th—from Range 1—1153 cattle, 60 showing tuberculosis. From other ranges in this State, 26,330 cattle, 1121 tubercular.

From ranges of other States, 10,159 cattle, 33 tubercular.

It is safe to say that practically none of these cattle ever saw the inside of a barn, for while the practice prevails in this State, to a considerable extent, of annually restocking the ranges with dairy calves, very few of these calves are dropped in stables, but live out of doors from the beginning. This is, however, by no means the only source of supply; thoroughbred bulls are frequently introduced from breeding farms. These bulls, if kept till eight years of age or longer, are almost invariably consigned to the rendering tank on account of generalized tuberculosis, when slaughtered. This condition of bulls is not confined to Range 1, but is true of nearly all the aged bulls killed, and especially so of thoroughbred animals, grades being more frequently free from disease.

Range 1 is large, well watered, and divided between rolling prairie and mountain; a small proportion is low.

While the lesions of tuberculosis found in range steers are frequently slight, calcified, and confined largely to the cervical region, it is not at all uncommon to find steers two to four years old with well-defined, progressive cases, indicating virulent types of tuberculosis which point to recent infection. In many cases it is impossible to locate the primary focus, the lesions all being, apparently, about the same age; yet a wider dissemination, and a more active stage, are noticeable from year to year, while the proportion of generalized cases to the whole number affected is increasing all the time.

Where do these active, vigorous steers get the contagium? Certainly not from the young calves just received from the dairy, for they are kept separate. True, some of these steers undoubtedly were originally dairy calves, and brought the infection with them to the range, but in these cases the primary focus would be calcified and encapsulated, or there would be a cachexia, indicating a long-continued struggle against the disease, while what we frequently find, where it is necessary to condemn for generalization, is an acute progressive tuberculosis, which points clearly to recent infection.

A very considerable difference in the number of cases of tuberculosis is noticeable between 1906 and 1907 from Range 1; this is due to an effort in 1906 to rid the range of the disease. How unsuccessful this effort was is shown by the figures for 1907–08.

If it is true that the bovine is not susceptible to tuberculosis; that only the strongest, most virulent type of organism can induce the disease, then it follows that we are breeding a type of tuberculosis so virulent that it is rapidly overcoming this lack of susceptibility of the genus bos.

Tuberkulose unter halbwildem Vieh in Kalifornien.—(BAKER.)

Die Meinung ist sehr weit verbreitet, dass das Leben im Freien nicht nur Tuberkulose verhindern, sondern auch heilen wird, sowohl in Menschen als auch im Rinde. Dies ist nur insofern wahr als ein Freisein von einer Infektion vorhanden ist.

Die Menge von Tuberkulose unter halbwildem Vieh, welche die Schlachthäuser bis zu diesem Punkte herausgefunden haben, beweist schliesslich dass das Leben im Freien allein nicht genügend ist, entweder um zu verhindern, oder eine Heilung zu erzielen.

Während die Verletzungen, die man bei halbwilden Stieren findet, häufig leicht, verkalkt und grösstenteils auf die Halsgegend beschränkt sind, ist es durchaus nicht ungewöhnlich, zwei bis vier Jahre alte Stiere

mit sehr bestimmten progressiven Erscheinungen zu finden, die virulente Typen von Tuberkulose zeigen, die auf frische Infektion hinweisen.

In vielen Fällen ist es unmöglich, den primären Herd zu lokalisieren, da die Verletzungen alle anscheinend desselben Alters sind; dennoch ist eine weitere Verbreitung und ein aktiveres Stadium von Jahr zu Jahr bemerkbar, während das Verhältnis allgemeiner Fälle zu der affizierten Gesammtzahl die ganze Zeit hindurch zunimmt.

Wo bekommen nun diese lebhaften, kräftigen Stiere ihre Ansteckung her? Gewiss nicht von den gerade aus den Ställen gekommenen Kälbern, da diese abgeschlossen gehalten werden; tatsächlich waren viele dieser Stiere zweifellos ursprünglich Milchkälber, und brachten die Infektion mit sich zur Herde, aber in diesen Fällen würde der primäre Herd verkalken und sich einkapseln, oder es würde Kachexie vorhanden sein, welche auf einen lang fortgesetzten Kampf gegen die Krankheit hinweisen würde, während das, was wir heute finden, notwendigerweise nicht als eine Verallgemeinerung betrachtet werden kann, und eine akute progressive Tuberkulose ist, welche deutlich auf eine frische Infektion hinweist.

Wenn es wahr ist, dass die Rinder nicht für Tuberkulose empfänglich sind, dass nur der stärkste, virulenteste Typus des Organismus die Krankheit hervorrufen kann, dann folgt, dass wir einen Typus von Tuberkulose züchten, der so virulent ist, dass sie sehr schnell diesen Mangel an Empfänglichkeit von Seiten des Rindergeschlechtes überkommen wird.

THE PREVALENCE OF TUBERCULOSIS AMONG DAIRY CATTLE IN THE VICINITY OF SAN FRANCISCO, CALIFORNIA.

By Archibald R. Ward, B.S.A., D.V.M.,
Assistant Professor of Bacteriology and Director of the State Hygienic Laboratory,
and Clarence M. Haring, D.V.M.,
Assistant Professor of Veterinary Science, University of California, Berkeley, California.

The idea that the close housing of cattle during the winter in ill-ventilated stables, with restricted hours of exercise, constitutes an important factor in the spread of tuberculosis is quite prevalent in the northern and eastern sections of the United States. It is quite generally believed in the east that the climatic conditions prevailing in California discourage the spread of tuberculosis. This is based upon the assumption that the mild climate, permitting greater freedom for the cattle, constitutes a powerful factor in the repression of the disease. The belief is undoubtedly fostered by the popular esteem in which California climate is held as a resort for human tubercular patients.

During the past four years we have applied the tuberculin test to enough cows in central California to make the results of some interest as indicating the prevalence of tuberculosis among dairy cattle there. Our work has been confined almost exclusively to herds supplying market milk for distribution in cities. Herds for this purpose are built up and maintained by the purchase of cows rather than of raising heifers. It is the usual practice in such dairies to sell the calves to the butcher very shortly after their birth. A few herds tested by us not producing milk for city supply, and in which the calves were raised, constitute interesting exceptions to the usual conditions found. In general, then, our results are not of value in indicating the prevalence of tuberculosis in all classes of dairy cattle. We have done a very limited amount of work among that class of dairy herds supplying milk for butter- and cheese-making.

We do believe that our results form a fair basis for estimating the prevalence of tuberculosis among dairies supplying market milk. The herds tested do not represent herds that were tested especially on account of a suspicion of the existence of tuberculosis. This is frequently the case with

conclusions drawn from results of applying the test under supervision of the State, under the system of providing compensation for condemned animals. Much of our work has been done in connection with inspection of dairy herds under municipal authority, for the purpose of merely excluding the milk of tubercular cows from sale. So far as possible every herd was tested, irrespective of suspicion concerning the existence of tuberculosis. On the other hand, we have been refused permission to test certain large herds, and have good reason to believe that the refusal was based upon the fact that the owner knew the disease to be prevalent in the herd.

In the table following we have summarized certain tests, including only figures for whole herds of five cows or over, which, to the best of our knowledge had never been tested before. Results of tests of bulls are included, but no calves.

TABLE I.

Herd Number.	Location.	Number Tested.	Number Condemned.	Per Cent. Condemned.
1	Palo Alto	148	59	39.0
2	" "	45	16	35.6
3	" "	44	11	25.0
4	" "	31	1	0.3
5	" "	17	1	0.5
6	" "	14	1	0.7
7	" "	8	4	50.0
8	Berkeley	150	51	33.3
9	"	73	9	12.3
10	"	58	8	13.8
11	"	17	9	58.8
12	"	17	1	0.5
13	"	17	3	17.6
14	"	16	12	75.0
15	"	5	0	0.0
16	Petaluma	39	0	0.0
17	Withheld	196	110	56.1
18	Lakeville	10	0	0.0
19	Walnut Creek	38	10	26.3
20	Knight's Landing	61	15	24.5
21	San Matio	10	5	50.0
22	San Luis Obispo	8	0	0.0
Total		1022	326	31.9

Percentage of herds found infected, 82.

This amount of tuberculosis is quite similar to, if not worse than, conditions in New York State. Moore* has combined figures obtained from work

* Moore: "Bovine Tuberculosis in New York State." A report prepared for the Joint Committee of the Committee on the Prevention of Tuberculosis of the New York Charity Organization Society and the Milk Committee of the New York Association for Improving the Condition of the Poor, page 11.

done under the direction of the Commissioner of Agriculture of New York State, and from private practitioners, and finds 32.26 per cent. reacting.

Herds 12, 13, 15, and 18 were isolated country herds, not producing market milk, and had been built up by the normal practice of raising calves. Herd 22, belonging to a State institution, was conducted in much the same way, although the foundation stock had been purchased from several sources. The larger dairies—invariably badly infected—had been built up by indiscriminate purchases of fresh cows.

One test made of part of a large dairy herd is not included in the above figures, but deserves mention. From a herd of 450 cows the foreman selected 50 fresh cows with reference to fine condition and probability of passing the tuberculin test. Those selected represented the choicest animals in the herd. The tuberculin test showed that 41 of them (83 per cent.) were tubercular.

When we come to a consideration of the results of tests of groups of five cows or less, the results are more satisfactory. Of 71 animals, only 6 (8 per cent.) reacted. The most of these cows were kept in Berkeley and pastured in vacant lots, restrained by a rope and stake. We believe that most of them had been raised under these conditions or in small isolated country herds. This practice of keeping cows represents the extreme to which animals may be isolated, and likewise presents the minimum of tubercular infection. The extent to which animals are associated with others seems to be the determining factor. Cows isolated show a low percentage of tuberculosis, while those crowded together in large herds show a high percentage.

We have made more tuberculin tests than those enumerated, but the additional ones represent examinations of selected groups of cows, or retests of herds in which similar work had been done before, resulting in the disposal of tubercular cows. In all, then, 1976 tests have been made, of which 453 (22.9 per cent.) showed reactions.

These figures of ours, it is true, do not cover a considerable portion of the State, but it is an undisputed fact that similar conditions exist in other sections of California. The information obtained by the veterinary inspectors of the United States Bureau of Animal Industry at abattoirs in California goes to prove that tuberculosis is widely distributed among dairy stock and among beef-producing animals raised on the ranges.

If it be conceded, then, that tuberculosis is prevalent in California, it may be of interest to compare the conditions under which cattle are kept in the east and in California, with reference to points of similarity and of difference.

These features in the care and maintenance of cattle are common to both California and the east. Calves are allowed to suckle cows to some

extent, or raw skim milk is fed to them without precautionary measures to prevent the transmission of tuberculosis through the milk. Cows are usually milked while standing in stanchions and eat the grain feed at that time. Many herds supplying market milk are built up and maintained through the purchase of animals rather than by raising them. Cows are uniformly subjected to the drain incident to bearing a calf each year and to the drain caused by milk production.

Here the similarity stops. Eastern cattle spend a large portion of the day in the winter in stanchions in the stable. This raises problems of ventilation, to secure for the cattle fresh air without the discomfort of drafts of air and cold. California cattle are stabled only during the time of milking,—say four hours a day,—and then in structures built so cheaply that the problems of ventilation do not need consideration. Except during milking-time, dairy cattle live a free life in the open air. During several months, when dry, the cows live out-of-doors continuously, feeding on broad ranges of pasture land.

The essential fact is, then, that dairy cattle in the east and in California have the same opportunities for infection through milk or by association together in the same stable during feeding. The amount of tuberculosis found by us in California is practically the same as found in New York—a typical eastern State in climate. The hours of confinement in the stable and climatic conditions—the two great points of difference—exert no influence on the prevalence of tuberculosis.

In connection with the control of tuberculosis in cattle we must not rely upon regular exercise, fresh air, and stable ventilation as factors in the repression of the disease. It should be recognized that with these sanitary measures tuberculosis will flourish if we neglect to take into account the tubercular cow and her milk.

La prevalencia de la Tuberculosis entre el Ganado de Leche en California.—(WARD Y HARING.)

Prevalece en la porción más fría de los Estados Unidos la idea de que el mantener el ganado de leche encerrado en establos mal ventilados con horas restringidas para ejercicio, constituye un importante factor en la propagación de la tuberculosis. Se cree generalmente allá que las condiciones de clima que prevalecen en California debilitan la propagación de la tuberculosis. Esto se basa en la suposición de que un clima suave que permite mayor libertad al ganado constituye un poderoso factor en la represión de la enfermedad.

Durante los últimos cuatro años hemos aplicado la prueba de la tuberculina á suficiente numero de vacas en la California central como para hacer

de algun interes el resultado que indica la prevalencia de la tuberculosis entre el ganado de leche en aquella region.

Nuestra trabajo se ha circunscrito en gran parte á los rebaños que suplen el mer cado de leche para distribución en las ciudades. Los rebaños para este propósito son criados y mantenidos con la compra de vacas màs bien que por la cría en rebaños.

Los rebaños probados no representan aquellos que se probaron como resultado de sospecha en cada caso particular. Mucha parte de nuestro trabajo ha sido hecho en unión con la inspección de los rebaños de leche bajo la autoridad municipal, con el propósito de excluir la leche de las vacas tuberculosas que intenta venderse. Tanto como fué posible, cada rebaño fué probado independientemente de sospecha alguna respecto á la existencia de tuberculosis. Se nos ha sido rehusado permiso para probar grandes rebaños, y tenemos buenas razones para creer que ello se basa en el hecho de que el propietario sabía que la enfermedad prevalecía en el rebaño...

Hemos probado 22 rebaños, que contenían 1022 vacas por todo, de las cuales 326, ó sea 31.9%, dieron reacción. 82% de los rebaños estaban infectados. Estos numeros solo incluyen rebaños enteros de cinco vacas ó más, que nunca habían sido sometidas á prueba antes.

Este percentage corresponde muy aproximadamente con los resultados obtenidos en el Estado de Nueva York.

Cuando consideramos los resultados de pruebas de grupos de cinco vacas, ó menos, las conclusiones son más satisfactorias. De 71 animales, solo 6 (8%) dieron reacción. Las más de estas vacas eran tenidas en Berkeley, California, y eran pasteadas en lotes vacantes y amarradas por una cuerda á una estaca. Este modo de tener vacas representa el extremo á que pueden aislarse los animales, y por tanto indica el minimum de infección tuberculosa.

Estos hechos en el cuidado y mantenimiento del ganado son comunes tanto á California como al Este. Se permité á los becerros mamar las vacas hasta cierto punto ó se los alimenta con nata de leche cruda sin medidas precautelativas para prevenir la trasmisión de la tuberculosis por medio de la leche. Las vacas son comunmente ordeñadas de pió sobre puntales y en ese momento comen el alimento de granos que les dan. Muchos rebaños que suplen el mercado de leche son hechos y mantenidos con la compra de animales más bien que por la crianza. Se somete á las vacas á la contribución uniforme de tener un becerro cada año y á la causada por la producción de la leche.

Hasta aquí la semejanza. El ganado en el Este pasa gran porción del día en invierno en puntales en el establo. Esto trae problemas de ventilación para asegurarle al ganado aire fresco sin disturbios por corrientes de aire y por el frío. El ganado de California es mantenido en el establo solo

durante el ordeño, ó sea cuatro horas al día, y en tan baratas estructuras que el problema de la ventilación no necesita considerarse. Excepto en el ordeño, la vaca de leche vive vida libre en campo abierto. Durante varios meses, durante la sequía, las vacas viven afuera continuamente, alimentándose en anchos campos de pasto. El hecho esencial es, pues, que el ganado de leche en el Este y en California, tiene las mismas oportunidades para la infección por la lehce, ó por la asociación en el mismo establo durante la alimentación. El pobre percentage de tuberculosis en las vacas de la ciudad puede explicarse por el aislamiento individual que evita el estrecho contacto con otros. Las horas de confinamiento en el establo y las condiciones de clima, los dos grandes puntos de diferencia, no tienen influencia en la prevalencia de la enfermedad.

Das Vorherrschen von Tuberkulose unter den Milchkühen in der Umgegend von San Francisco, California.—(WARD UND HARING.)

Die Idee, dass enges Beisammensein von Rindern während des Winters in schlecht ventilierten Ställen mit beschränkten Stunden von Umhergehen einen bedeutenden Faktor in der Ausbreitung der Tuberkulose darstellt, ist in den kälteren Gegenden der Vereinigten Staaten ganz weit verbreitet. Dort glaubt man allgemein, dass die in California herrschenden klimatischen Verhältnisse der Ausbreitung der Tuberkulose hinderlich sind. Diese gründet sich auf die Annahme, dass das grössere freiheitlassende milde Klima einen mächtigen Faktor in der Unterdrückung der Krankheit bildet.

Während der letzten vier Jahre haben wir die Tuberculinprobe bei genug Kühen in Mittel-California angewendet, um die Resultate interessant genug zu machen um anzuzeigen, dass die Tuberkulose unter den Milchkühen jener Gegend vorherrscht.

Unsere Arbeit beschränkte sich hauptsächlich auf Herden, welche die Milch für den Verkauf in den Städten liefern. Herden für diesen Zweck werden aufgebaut und unterhalten mehr durch den Kauf von Kühen als durch Aufziehung von Kälbern.

Die geprüften Herden stellen nicht diejenigen dar, die als ein Ergebniss von Verdacht in einem besonderen Falle geprüft worden waren. Ein grosser Teil unserer Arbeit wurde in Verbindung mit der Prüfung von Milchkühen unter Gemeinde-Aufsicht ausgeführt, um die Milch von tuberkulösen Kühen vom Verkaufe auszuschliessen. So weit als möglich wurde jede Herde, ganz abgesehen von dem Verdacht des Vorhandenseins, geprüft. Die Prüfung gewisser grosser Herde wurde uns verweigert, und wir haben guten Grund zu denken, dass die Verweigerung auf der Tatsache beruhte, dass der Eigentümer von dem Vorhandensein der Krankheit in seiner Herde wusste.

Wir prüften 22 Herden, zusammen 1022 Kühe, von denen 326, oder 31.9% reagierten. 82% der Herden waren infiziert. Diese Zahlen schliessen nur ganze Herden von fünf oder mehr Kühen ein, die vorher noch nie geprüft worden waren.

Dieser Prozentsatz stimmt sehr genau mit dem in New York erhaltenen ein.

Wenn wir die Resultate von Proben von Gruppen von fünf oder weniger Kühen betrachten, sind dieselben mehr zufriedenstellend. Von 71 Tieren reagierten nur 6 (8%). Die meisten dieser Kühe waren in Berkeley, California, und waren auf der Weide in unbebauten Plätzen und mit langen Seilen angebunden. Diese Weise der Haltung von Kühen stellt das Extrem dar, wie die Tiere isoliert werden können, und bietet auch das Minimum der Tuberkelansteckung.

Diese Züge in der Pflege und der Haltung von Rindern sind dieselben in California und dem Osten. Kälber dürfen zu einem gewissen Grade an den Kühen saufen, oder rohe abgerahmte Milch wird ihnen ohne besondere Massregeln zur Verhütung der Uebertragung von Tuberkulose durch die Milch gefüttert. Die Kühe werden gewöhnlich gemolken während sie in einem Stalle stehen und zur selben Zeit Kornfutter fressen. Viele Herden, die Milch für den allgemeinen Markt liefern, werden mehr durch den Ankauf von Kühen als durch die Aufzucht aufgebaut und erhalten. Die Kühe werden gleichmässig der Aussetzung des jährlichen Kalbens, also auch der der Milchproduktion unterworfen.

Hier hört die Ähnlichkeit auf. Rinder im Osten bringen während des Winters einen grossen Teil des Tages in Ställen zu. Dieses stört das Problem der Ventilierung auf, um den Rindern frische Luft ohne die Unbequemlichkeit kalter Luft zu liefern. Californische Kühe werden nur während des Melkens in die Ställe gebracht—sagen wir vier Stunden im Tage—und dann in Gebäuden so billig hergestellt, dass die Ventilierung nicht in Betracht kommt. Ausser während des Melkens leben die Milchkühe ein freies Leben im Freien. Während einiger trockener Monate sind die Kühe ständig im Freien und fressen auf grossen Weiden.

Die wesentliche Tatsache ist daher, dass die Milchkühe im Osten sowohl als auch in California die gleichen Gelegenheiten für Ansteckung durch Milch oder durch das Zusammensein in demselben Stalle während der Fütterung haben. Der niedere Prozentsatz von Tuberkulose in Stadtkühen kann wohl der Isolierung von anderen Tieren zugeschrieben werden. Die Stunden der Einsperrung und die klimatischen Verhältnisse—die zwei grossen Unterscheidungspunkte—üben keinen Einfluss auf das Vorhandensein der Tuberkulose aus.

TUBERCULOSIS OF CATTLE FROM THE POINT OF VIEW OF THE FARMER.

By Professor Jesse E. Pope,
East Orange, N. J.

The sections of this Congress concerned with the suppression of tuberculosis among human beings can make the inspiring announcement that practically everywhere the disease is on the decline; while the sections occupied with the problem of tuberculosis among domestic animals must announce that thus far all efforts even to check its advance have, with few exceptions, failed; for in nearly all lands bovine tuberculosis, and hence tuberculosis of other animals, is on the increase.*

It is true that animal tuberculosis presents peculiar difficulties; but in view of the facts that since 1892 we have had a delicate and certain test for aiding early diagnosis, and that it is within the realm of possibility to destroy all diseased animals at once, the situation is humiliating.

The cause of this failure to make progress against animal tuberculosis is not far to seek; measures for combating the disease have been ill considered or inadequate, or have proved abortive from failure to win the farmer's co-

* The following table, compiled from the reports of the Bureau of Animal Industry, shows trend of disease among animals slaughtered subject to Federal inspection:

Year.	Cattle.		Hogs.	
	Number Condemned.	Per Cent. Condemned.	Number Condemned.	Per Cent. Condemned.
1901	6434	10	8650	0.035
1902	7944	14	14927	0.059
1903	8598	14	20299	0.092
1904	10173	16	34656	0.143
1905	10956	18	64919	0.256
1906	13548	19	95896	0.321
1907	19305	25	65618[a]	0.25

[a] In 1907, 364,559 parts were condemned, as over against 113,491 in 1906.

The slaughter records of Europe show the same trend. (See United States Department of Agriculture Bulletin No. 38.) Even in Denmark the 1907 report of the coöperative slaughteries shows slight increase of disease among hogs. (Andelsbladet, April 3, 1908.)

operation and support, upon which must ultimately depend the success of our crusade. The farmer's opposition is due to his failure to appreciate the seriousness of the situation, to his distrust of the remedies proposed, and, above all, to the fact that the financial burden imposed on him seems out of all proportion to the benefits he is to receive. He is told that certain animals in his herd are afflicted with a highly infectious disease, and that his family and, if he is a dairyman, his customers are in grave danger of catching consumption. To the charge that his herd is diseased he points out that his animals are sleek and glossy and, to all appearances, in prime condition. It is true that from time to time a cow "goes bad" and must be disposed of, and sometimes animals go into a decline and die; but the farmer is accustomed to losing stock now and then; and by the American farmer in particular such losses are accepted as a matter of course. To the warning against consumption he points to his rosy-cheeked children, and declares that for generations there has been no consumption in his family, though they have always drunk raw milk.*

If he is engaged in general farming and sells stock on the market, he usually sees no connection between the price paid for his animals and the presence or absence of the disease. If he is a breeder of registered cattle, his customers do not demand a certificate of health, or if they do demand it, are unwilling to pay for the trouble and risk. He has seen animals pronounced diseased by the tuberculin test and slaughtered which, on post-mortem, have been declared sound; and, on the other hand, he has seen animals pronounced sound which, in a short time, died of general tuberculosis. He is told to ventilate his stables and to disinfect them; but he observes that animals are tuberculous which are never put in barns; and after complying with the regulations, he discovers that in a comparatively short time conditions are as bad as before.†

In America he has seen the law applied ruthlessly in one case and not at all in another; his own herd has been singled out for condemnation, and his neighbor's, which he believes to have been as bad as his, has remained unmolested.‡ By hysterical notoriety his business has been injured to an extent which cannot easily be estimated. In many cases the requirements of the law have increased the fixed charges of carrying on his business, and, being unable to shift the expense to the consumer, he naturally feels resentment. His compensation for condemned animals has been inadequate or

* The apparent immunity of country children from bovine infection may be partially due to the fact that country mothers usually nurse their children, and to the further fact that country people as a class are not large consumers of raw milk.

† "Some of the worst outbreaks we have investigated were confined to animals that never had been kept in barns." (Bull. No. 29, Iowa Experimental Station, p. 254.)

‡ A farmer of unusual insight, formerly a breeder of registered stock, writes me: "They [the farmers] see only its [the tuberculin tests] application in isolated cases, and so can see no broad beneficial results. They are right."

uncertain, or the delay and trouble in collecting it out of all proportion to the amount.*

If he sells his cattle on the market, he must meet the demands of Federal inspection; if he buys from or ships to another State, he must meet the interstate regulations; and if he sells milk, he must comply with those of the municipalities wherein are his customers. All along the line there are confusion, uncertainty, trouble, and expense; and he is not convinced that any one is benefited or that the disease is being stamped out; but he is sure that he is willing to bear the loss from the disease if only he can be let alone.

Doubtless much of the farmer's resentment grew out of the hasty, harsh, and crude regulations of the nineties,† when bovine tuberculosis and the tuberculin method of diagnosis were imperfectly understood and the enforcement of the law was left to ignorant and unskilful officials; but despite the great advance made since then, the farmer feels that he still has just grounds for complaint.

The early policy of ruthlessly slaughtering all infected animals without compensation has been largely abandoned. To-day, before a herd is subjected to the tuberculin test, each animal is appraised at its market value. Those showing physical signs of the disease are slaughtered without compensation or with nominal compensation. Reacting animals which on post-mortem examination show general tuberculosis are usually paid for at a lower rate than those in which the disease is localized. The usual custom is to fix a maximum flat rate of payment, which is higher for registered than for common stock. In Pennsylvania, for example, the maximum compensation for an animal of common breed is $25, and for a registered animal $50; in Wisconsin the maximum appraisal is $50; in Massachusetts it is $40, of which 40 per cent. is paid in case the animal is found to have general tuberculosis and 60 per cent. if the disease is localized; in New York these figures are 50 per cent. and 80 per cent. respectively; in Minnesota the maximum is fixed at $35 for common stock and $75 for registered. In some States, Illinois, for example, no provision is made for compensation.

A farmer who does not wish to accept these terms may dispose of his cattle for beef, but waives his right to compensation. Before receiving payment for condemned cattle the farmer must thoroughly disinfect his premises and put them in sanitary condition, and must agree to submit his herd to future tests and not to introduce untested animals into it. In order to have his herd tested free, he must, as a rule, make application, giving his reasons for believing his herd diseased; and in case he cannot do this, he must himself bear the expense of testing. To obtain compensation for his cattle he

* See New York Animal Sanitation Committee, p. 7, 1901.

† "The kill-all-without-compensation method early advocated by some extreme scientists and veterinarians is largely responsible for the farmers' antipathy to the tuberculin test." (Personal letter from editor of "Breeder's Gazette.")

must show that they have been in the State a minimum length of time, which varies for different States: in New York it is six months, in Wisconsin four months, and in Massachusetts it is one year.

This system of compensation the farmer considers inadequate and unfair. Since, under the most favorable regulations, the maximum payments cover only a bagatelle of the direct financial loss, and since to this loss must be added the expense of meeting the other requirements of the law, even moderate infection of a herd must often result in the owner's ruin. The farmer does not expect large compensation for animals showing physical signs of the disease; they are not many, and his sense of fairness is met. But he feels that $25 for a dairy cow in full milk or about to drop her calf is not enough; for he cannot replace her for less than two or three times this amount. To ask a breeder of registered animals to accept $50 or even $75 for each of his reacting animals is to ask him to erect his own financial scaffold. The alternative of selling cattle for beef helps matters but little; for dairy cows are seldom fit for beef, and in case of registered stock the objection is obvious. The farmer cannot understand why compensation should be refused for cattle imported from another State; as a dairyman must often replenish his herd with cattle from a distance, it frequently happens that he has many cattle for which he must run the risk of standing the entire loss, unless he waits some months before cleaning up his herd. Nor can the farmer understand why he must bear the expense of testing simply because he is not sure that his herd contains tuberculous animals.* He is asked to bear the expense of the test unless he is sure that his herd is diseased, supposedly on the ground that advertisement of the fact that his herd is free from tuberculosis will redound to his benefit, and that therefore he ought to pay the cost of testing. Perhaps he ought, as a matter of justice, but this seemingly hostile attitude of the authorities or lack of interest repels him; he does not take the step, and his good example is lost.

Within the State the test is not compulsory; and since the seller of cattle is not compelled to use it, the farmer who has cleaned up his herd and is obliged to replenish it with tested cattle must bear the risk of the test by paying a higher price. The farmer who voluntarily cleans up his herd and sends his reacting cattle to market is not only heavily mulcted for the diseased parts, but must also suffer the usual discount on the price of cattle from an infected region, despite the fact that since he sells his cattle subject to test the packer runs no risk.†

When an animal, often of great value, is found on post-mortem to be only

* Russell found that in Wisconsin 20 out of 42 unsuspected herds contained tuberculous members. (Wisconsin Agricultural Experimental Station Bulletin 84, March, 1901, p. 4.)

† The condition of affairs as it exists in Iowa is excellently set forth in Wallace's "Farmer" for July 13, 1908.

slightly infected, or is even pronounced sound, the owner feels the loss keenly and regards the appraisal value as wholly inadequate. But even if adequate compensation were to be made for the direct financial loss, there would still remain certain losses, not easily measured, it is true, but to the farmer none the less real, for which compensation cannot easily be rendered.

The opposition of the farmer, together with the failure of the State to provide adequate funds,* has led to the application of the Bang system, under which the farmer may, if he so chooses, retain reacting animals on his farm, provided they are kept isolated. This means separate pastures, separate barns, and, when possible, different sets of helpers. All milk from diseased cattle must be pasteurized; their calves as soon as dropped must be removed; and the well herd must be submitted to frequent tuberculin tests.

When first introduced, the Bang method seems to satisfy the farmer; but it soon loses favor with him. It involves much trouble and expense and the farmer receives no financial aid from the State. The necessity of pasteurizing the milk from reacting cows may mean heavy loss to the dairy farmer, because under present conditions pasteurized milk cannot be sold at all or must be disposed of at a lower price than that of raw milk, although its cost of production is greater; indeed, it is exceedingly doubtful that pasteurized milk from cows known to be tubercular can ever find a market. Few dairy farmers are in the position to maintain a double equipment;† the persistent carrying out of the regulations necessary to prevent infection of the well part of the herd, and, in general, the building up of a sound herd by this method, involve trouble and expense which will not pay except in the case of fine milking strains. What has been said of the dairy farmer applies with even greater force to the general farmer, whose system of farm management makes the application of this method impracticable.‡

In the districts where milk is sent to a central creamery, the skimmed milk returned is a fruitful source of infection. Laws have been passed providing that it be pasteurized, but in most cases creameries do not obey them, and even if they did, the custom of not running creameries on Sunday would partially nullify the law because of the impracticability of pasteurizing the milk

* In some States no compensation is allowed; in other States the laws granting compensation have been nullified by failure to make appropriations; while in others the amount allowed has been inadequate and the appropriation has become exhausted; in no single State has the appropriation been adequate to wage an effective campaign against the disease.

† However good sanitation, there will be infection if well and diseased animals are kept in same stable. (Dr. Leonard Pearson, Pennsylvania Bulletin, Department of Agriculture No. 74, 1901, p. 8.) Bang states that a connecting door is dangerous, and that whenever it is possible there should be separate farms. (Ibid., Bull. 75, p. 258.)

‡ Mr. Henry Wallace, who is intimately acquainted with American farm conditions, writes me: "I do not think that the Bang method of treatment will be practicable on the average farm, not so much because of the extra labor and expense, but because the farmer ordinarily would rather stand the loss than to go to so much trouble."

of Sunday and of Monday morning. When the farmer owns his own separator and has infected cows, pasteurization becomes necessary, but he is seldom in the position to afford the labor and trouble involved. In Denmark, it is true, where the home separator is not common, the central coöperative creameries do faithfully pasteurize the skimmed milk; but the Danish farmers are used to taking infinite pains, and have learned to follow the advice of science, and, moreover, the economic pressure due to the very great importance of dairying in Denmark must be taken into account. In beef-producing regions, where calves run with their dams, the method can, of course, not be applied.

In the case of the breeder of registered stock the conditions are not the same. He usually employs a better class of labor, and his more elaborate and expensive farm improvements enable him better to carry out segregation; but breeders who accepted the Bang method with enthusiasm have, after trying it, become doubtful of its practicability, owing to the trouble and large expense of maintaining isolated herds and the costly mistakes entailed by frequent testing of animals; well animals are often slaughtered and, more serious still, sick ones are often retained in the herd; for the breeder's experience seems to be that in certain stages the disease can be detected neither by physical examination nor by the test.* The difficulty of avoiding mistakes is strikingly shown by the fact that at the recent international fat stock show the steer which had been fed by one of our leading agricultural colleges and which surpassed all former records and brought the highest price after passing all the experts was, on post-mortem, found to be so badly infected with tuberculosis that the carcass was unfit for food.

* Hon. W. C. Edwards, of Rockland, Ontario, owing to his public spirit in dealing with tuberculosis in his own herd, has been widely quoted as to the efficiency of the Bang method. The following extracts from a personal letter, written in September, 1908, ought to be of interest: "I most certainly think that the Bang system is a most excellent one for any one to practise. I may say, however, that I do not think that many farmers, or even breeders, will go to the expense and trouble involved in the practice. Personally, I may say that the riddance of tuberculosis through the Bang system is very effective; but it is very expensive to practise as we practise it here. If I had to do it over again, my plan woud be to found a distinctly new herd on a separate farm, or removed some distance from the buildings of our present farm, in an entirely new set of buildings or buildings thoroughly disinfected. There keep a certain number of thoroughly healthy nurse cows, and from each cow of our pure-bred herd that we wish to make the foundation of our new herd, take the heifer calves as immediately dropped and remove to our new premises. And through this process in a few years have an entirely new and fresh herd." Mr. Edwards insists that with the most careful testing you can never be sure that you have weeded out all affected animals, since "Some of your finest and most robust animals are those which have the disease in the most severe form, which clinic examination cannot discover. While I am a believer in the test [tuberculin], I am not a believer that it is efficacious in every instance, and herein lies the danger of it. It, however, can be made useful and is useful in many ways. But in applying it year after year, or even every six months, to ascertain the real condition of the herd, the most serious mistakes can be made and are made. This, I frankly tell you, has been our greatest difficulty, and has resulted in enormous loss to us. So much so, that I am going to practise exactly what I have stated above, viz., I am going to have an entirely new, separate, and distinct herd."

In so far as the question of compensation is concerned, neither the slaughter of infected animals nor their retention under the Bang system satisfies the farmer; under either procedure the financial burden entailed seems to outweigh the gain which comes to him; and only under pressure exerted by the consumer of his milk does he coöperate with the State in fighting the disease.*

We are led here to take up the attitude of the farmer toward the tuberculin test. I know of nothing that has so hampered the fight against bovine tuberculosis as the almost universal distrust of the tuberculin test which prevails among farmers. No doubt this is due partly to the natural conservatism of the farmer, partly to influence exerted upon him by supposed authorities, and partly to the fact that the test affords the means of attack upon his herds. But after due allowance is made for these factors, there still remain justifiable grounds for the farmer's opposition. Those who applied the test in the past have made many blunders, and to-day the mistakes are so many and so widely known that the veterinarians, or those who claim this title, have much to answer for. The custom is to apply the test and, in case of reaction, to test its correctness by careful post-mortem examination. This puts the one who applies the test on the defensive, and in case disease is not found, the farmer is filled with anger and contempt, even though he is paid full market value for the animal which he believes to have been mistakenly condemned. A mistake such as occurred recently in Minnesota, where four out of eleven animals slaughtered were pronounced perfectly healthy, will prejudice an entire community against the test. What is even more serious, animals far gone with disease are often pronounced sound and left in the herd. Veterinarians venture to assert that physical examination can discover such animals; but the farmer's experience is against this contention, for in many instances such cattle have passed the physical test and yet have died from the disease a few months later.†

To the breeder of fine stock such mistakes are grave indeed. They may result in the useless sacrifice of a healthy animal and the retention in the herd of an animal the presence of which will make such sacrifice worse than useless. My conviction is that unless such mistakes can be avoided, the oppo-

* This tuberculin [that sent out by the department] has been used almost exclusively for testing dairy cattle." (Distribution of tuberculin, etc., by the Bureau of Animal Industry, Year Book of Department of Agriculture, 1906, p. 352.)

† The farmer mentioned in a former foot-note also relates an incident which throws so much light on the psychology of the question from the farmer's view-point that it is well worth a place in this paper. When he dispersed his herd, he sold an unusually fine cow to a farmer living in another part of the State. Meeting the purchaser at the fair some time later, he was told that the cow had a fine calf and was the finest cow in the herd. "A year later I met him again and asked about the cow. He told me that he had had the herd tested, and that she had been condemned and killed and that post-mortem had revealed nothing the matter with her; that she was apparently still the finest cow he had and that the useless slaughter made him feel very sore."

sition to the extensive use of the test will be overwhelming—a condition of affairs which would be most unfortunate.

The tuberculin test has not been made compulsory. Such a step would be bitterly opposed by farmers, not so much perhaps because of lack of faith in the test's efficiency as because of inadequate compensation received. Dealers in milk have encouraged this opposition because they fear if the test were to be made compulsory the farmer would demand more for his milk, and that the price to the consumer could not be proportionally raised. This fear is well grounded. Many people who favor the test for cows supplying milk for cities do not deem it generally necessary. Breeders, conscious of the high degree of infection in their herds, have exerted their powerful influence against the test. As the result of all of this opposition, the authorities have timidly hesitated to make it compulsory, feeling that sufficient funds would not be forthcoming to make possible the carrying out of the law.

The farmer sees little logic in the requirement that cattle shipped in from another State shall pass the test when those bought within the State are not subjected to it. Why should a New York farmer, for example, be permitted to buy an untested bull from within his own State, but not from Pennsylvania? The chance of getting a diseased animal is no greater in the latter case, and what is to be gained if his own herd is not free from the disease? Though led to believe that the disease is highly contagious, he sees feeders and cattle for show purposes exempted from the test to which cattle for breeding and dairying are subjected; yet he knows that many of these feeders are worn-out dairy cows, which are shipped to the city to be sold to farmers and by them turned into beef. That such feeders are scattering the disease into non-dairying districts is a well-known fact.* The wisdom of the policy of exempting show cattle from the test is, as far as its effect upon the stamping out of tuberculosis is concerned, extremely doubtful.

While not wishing to take up the problem of control, let me indicate the lines along which it seems to me that measures must be framed in order that State and farmer may effectually coöperate in stamping out tuberculosis. The farmer feels that the direct financial loss should be met by society as a whole, which, as consumer, would be more than repaid for the expenditure, and that the indirect costs which he must bear constitute his own fair contribution. With better compensation and careful regulation, the opposition of

* The following case, furnished me by a physician of high standing, is well worth recording. In the spring of 1900 a farmer of Adair County, Iowa, shipped in a carload of young feeders from New York State. These cattle were separated from his herd by a barbed wire fence. Some months later the farmer's fourteen-year-old daughter was taken ill with miliary tuberculosis. On investigation it was discovered that she had been drinking milk from cows which were suffering from tubercular diarrhea, and some of which died later with acute tuberculosis. The farmer lost two-thirds of the cattle shipped in and his home herd was practically ruined by infection; yet he lost his suit for damages against the man who had sold him the infected cattle.

the average farmer to the compulsory test would, I believe, disappear. As soon as an animal is known to be tubercular it should become the property of the State, and if destroyed, should at once be paid for at its full market value, unless it shows physical signs of the disease. This procedure would do away with the fruitful source of disputes over paying for animals after post-mortem and recouping for sound animals slaughtered. No longer would time and money be spent in painfully and minutely going over a carcass to find lesions often too slight to convince the farmer that he has not been defrauded. The uncertainty as to the amount of his compensation and the time when he is to receive it ought to be removed.

Until the disease is stamped out, cattle sold on the general market should be marked in such a way that those which, on slaughter, prove to be tuberculous can be traced back to the farmer, who should, however, receive for them the full market value, on condition that he shall immediately proceed to clean up his herd. The local butcher and packer ought not to stand the loss from buying tuberculous cattle, for they at once protect themselves by throwing the cost back on the farmer, who becomes irritated.

In the warfare against tuberculosis the coöperation of the stock-breeder should most earnestly be sought; for it is he that has most at stake, and it is his stock that we can least afford to destroy; yet he has scattered the disease from Sweden to Argentina, and is still doing it.*

The farmer is urged to improve his stock, but what is to be said when by so doing he runs nine chances in ten of introducing tuberculosis among his animals? Despite this startling condition, breeders as a class have refused to make use of the tuberculin test. At a sale of high-bred Holstein stock at Syracuse, New York, June 5, 1908, no purchaser demanded that the cattle should pass the tuberculin test. In dairy districts some breeders have advertised that their cattle are sold subject to test; but they are exceptions;† and in view of the tremendous financial loss involved under the present system of compensation, nothing better could be expected. No one thing could more aid in the suppression of tuberculosis than giving to the breeder financial support sufficient to encourage him to take steps toward furnishing farmers with breeding stock above suspicion. Some scheme must be devised whereby the State can coöperate with the breeder in building up sound herds by the Bang method or a modification of it.

We have said that the average farmer finds the Bang method impracticable; but the immediate slaughter of all infected animals would be, at

*Russell mentions a case where one breeding herd scattered infection to sixteen farmers' herds. (Wisconsin Agr. Exp. Sta., Bull. 114, p. 8, June, 1904.)

†The English breeders of short horns refused to have their animals subjected to the tuberculin test. (Select Committee on Tuberculosis, p. 10.) It is, however, reported that many breeders in the middle west are about to adopt the practice of selling all cattle subject to test.

best, wasteful and expensive, and in dairying regions it is out of the question. Where the degree of infection is relatively low, it would be possible for the State to remove all infected animals to special quarantine farms, where they could be handled in the wisest and most economical way. This work could well be placed under the control of our State colleges of agriculture, to which the problem would present little difficulty. In the dairying districts the higher degree of infection and the importance of keeping the reacting animals for breeding purposes make the problem more difficult; for the more intimate working together of the State and the individual farmer is imperative. But all that is required is that the State shall take charge of reacting cattle in close enough proximity to the owner's farm to afford him easy access to them. It would, of course, be impracticable for all infected cattle to be taken in charge at once; a given region would have to be districted and careful provision be made so that districts cleaned of the disease would not become reinfected.

The questions of sanitation and disinfection have occasioned much irritation; unless a great deal of common sense is used by the authorities, the changes required in buildings and premises are so expensive that farmers revolt or go out of business. What State and farmer need fully to grasp is that the presence of infected cattle is frightfully and persistently expensive, and that the necessary precautions are so costly and troublesome as to be hardly possible, while even when they are consistently taken, the results obtained are often most discouraging. Disinfection is a science, and the average farmer is quite incapable of carrying it out himself; time, skill, and proper appliances are lacking; and therefore disinfection by the farmer is usually a mere farce. It is unnecessary to add that unless this work is thoroughly done it is quite useless to clean up the herd.

In thus presenting what appears to me to be the attitude of the average farmer toward bovine tuberculosis, I do not wish to give the impression that I think his position always reasonable or even just, or that I feel that he has always assumed his fair share of responsibility. But a man acts in exactly the same way from imaginary grievances which he believes to be real as from real grievances. Since this is the case, and since, under the most liberal treatment, the burden of stamping out tuberculosis must rest upon the farmer, it will be wise to satisfy his sense of justice and overcome his opposition by affording him liberal aid until the disease is well in hand; but as soon as this has been accomplished it should clearly be set forth that the individual must be strictly responsible for keeping his herd free from the disease, and must himself bear the expense. When this time shall have arrived, it is the business and the duty of the veterinarian to determine. If experience teaches us anything, it teaches us that sporadic, vacillating, penny-wise

combating of the disease exasperates the farmer, wastes the money expended, and makes the ultimate stamping out of bovine tuberculosis increasingly difficult.

DISCUSSION.

DR. REYNOLDS (Minnesota): I am glad to hear the farmer's view expressed on this subject. This paper should serve to awaken us, and I am glad to attend an association where there is a farmer who can present the farmer's side of the question. We have made very slow progress, as there has been no coöperation with them—we worked as separate individuals. The great body of city dairymen are very progressive men, and there are a number of propositions involved in this tuberculosis problem. These men consider the seriousness of tuberculosis, but nevertheless they are restless and ready to fight hard any movement which will injure their business. We can therefore understand their antagonism. One important problem which we should solve is a better utilization of the tuberculous cow. This is one of the most important questions confronting us. Cannot the tuberculous cow be better used for some other purpose than to destroy her? I think we should buy the tuberculous cows at their average carcass value, and use them in some way by which we can get some products; then label these products honestly and place them on the market. Can these propositions be carried out? If not, there is no other better proposition than to kill the cow and get what price you can. There are two reasons why owners of tuberculous cattle should receive some reimbursement, and it is equally fair that they should bear some of the loss. A pure-bred cow may be capable of raising a calf which may be worth $200 or $300 at birth. Whether such an animal should be kept isolated or killed should be determined purely from an economical standpoint. This should be considered, in view of the fact that we pay $35 or $40 for a healthy ordinary cow. Now, there are a number of points which interest me very much. With reference to the tuberculin test, I would like to cite some cases in Minnesota where the tuberculin test gave a reaction in animals which on post-mortem examination failed to show the presence of tubercular lesions. In Minnesota we have proposed a rule which specifies what should constitute a tuberculin test which we will receive as satisfactory and upon which we will reimburse owners. One essential is that the test should be made by a reliable veterinarian, as the failure of reacting animals to show lesions may be often attributed to a neglectful application of the test. The farmer should be impressed with the seriousness of the tuberculosis problem, and the veterinary profession should impress upon him the grave nature of that plague.

DR. TURNER: I think the farmer fails to appreciate his position as a pro-

ducer of healthy food, owing to the fact that he does not read current literature on the subject and therefore is not posted. I am unaware as to how tuberculosis of hogs can be properly handled unless the farmer is better educated along the lines of tuberculosis in his cows. Too many farmers go along in the same old rut year after year. Their complaints are frequently unjust, as they fail to follow the modern progress and are neglectful in undertaking any steps toward eradicating the disease from their herds. Such an earnest attempt would not only eradicate the disease from their herds, but it would also prevent the hogs from an infection which is always closely allied with tuberculosis of cattle on the same premises. Compulsory dairy inspection, where it is practised, certainly seems to diminish the number of tubercular animals in herds.

PROF. BANG: I cannot understand why my method is impracticable in this country. The isolation should not work any hardship on the farmer, but the destruction of the affected animals, which sometimes number as high as 80 per cent., might cause the ruin of the farmer. On the other hand, by isolation he may continue to use the animals for breeding and thereby build up a clean herd. If the cows are not highly affected with tuberculosis and there is no tuberculosis of the udder, the milk is free from tubercle bacilli, and there is no reason why that milk should not be used. The public prejudice against such milk which seems to prevail in this country is not justified. Besides, in Denmark, butter is always made from pasteurized milk, and accordingly the butter is always wholesome, and the milk of the isolated affected animals may thus be utilized in all cases.

DR. REYNOLDS: If Mr. Pope will give us an outline of his plans for controlling the disease, we shall be glad to discuss them.

MR. POPE: I am not a veterinarian, but I am very much interested in this problem of control. In the State of Iowa the bulk of the milk goes to the creameries. It is perfectly well known that tuberculosis is bad in that State, and the segregation of cattle there proved to be a difficult task for the farmer. The greatest objection to the Bang system is the difficulty in isolating the affected animals. This necessitates the farmer taking care of two distinct herds. It seems that the State colleges are better equipped for carrying out this system, but the farmer cannot do so. It seems that it would be of advantage to bring the affected cattle under State control to places such as the experiment stations, agricultural colleges, or State farming districts or centers, and under the supervision of these institutions the Bang system could probably be carried out effectively. Besides the isolation, the pasteurization of milk is almost impossible for the farmers, and with the limited help at their disposal it would be nigh impossible to carry out all the details in connection with this system. If tuberculosis is as serious a question as it would appear from these papers, far more strenuous measures will have to

be adopted; and if the farmers are opposed to these measures, you can do nothing. Farmers have been fined and imprisoned in England for not carrying out the law, and yet practically nothing has been accomplished there. The whole question of compensation is a question of getting the farmers' coöperation. If this is obtained, more than half of the battle of controlling tuberculosis is won. The indirect losses to the farmers are so heavy that even the market value of his animals would not compensate him. It is not true that the unintelligent men of this country are the ones opposed to the tuberculin test, as many of these men are doctors, lawyers, bankers, and retired business men. If you are a breeder of cattle and you think that 90 per cent. of them will react to the test, you are not going to submit to it. You would be ruined, and you know it.

SECTION VII.

Tuberculosis in Animals and Its Relations to Man.—(*Continued.*)

THIRD SESSION.

Wednesday morning, September 30, 1908.

THE PATHOLOGY AND BACTERIOLOGY OF TUBERCULOSIS IN ANIMALS.

Section VII of the International Congress on Tuberculosis was called to order, for its third session, at half-past nine o'clock, on Wednesday morning, September 30, 1908, by the President, Dr. Leonard Pearson.

TUBERCULOSIS IN WILD ANIMALS IN CAPTIVITY.

By W. Reid Blair, D.V.S.,

New York Zoölogical Park, N. Y.

My studies on tuberculosis as presented in this paper have been principally confined to the animals in the primates collection, owing to the fact that, with few exceptions, the animals in the New York Zoölogical Park, outside the monkey collection, have been remarkably free from tuberculosis.

Lesions: The general characters of the lesions produced in Simian

tuberculosis correspond, very closely to those of the human, and the bacilli found also simulate morphologically those of the human infection.

The tubercular lesions of monkeys are very extensive, practically every organ in the thorax and abdomen having been found invaded by the disease. As will be seen by the accompanying table, showing the anatomical distribution of tubercular lesions in animals examined in the New York Zoölogical Park, pulmonary tuberculosis is by far the most frequent form of the disease as found among monkeys.

Lungs: The lungs are usually affected by the miliary or nodular form of tuberculosis. The absence of pulmonary hemorrhage in monkeys in connection with pulmonary tuberculosis is a striking feature of this disease, and is accounted for largely by the fact that in the miliary form of tuberculosis, destruction of tissue and ulceration are quite limited.

The pulmonary cavitations so common in human tuberculosis are exceedingly rare in monkeys, very few cases having ever come under my observation. Chronic tubercular lesions are also much more infrequent in the monkey, and the pronounced fibroid changes of pulmonary tuberculosis as seen in man have never been observed by me in these animals. Neither do I find healed tubercular lesions in the tissues, particularly in the lungs of monkeys, as in man.

Liver: Infection of the liver by the tubercle bacillus gives rise to miliary tubercles; sometimes cheesy areas of various sizes showing extensive caseation are present. In one instance, that of an orang, I found numerous small tuberculous cavitations throughout the liver.

Kidney: Infection of the kidney by the tubercle bacillus presents the usual characteristics of miliary tuberculosis observed elsewhere. Occasionally a large portion of one kidney, or the entire organ, is converted into caseous substance.

Lymphatic Glands: Pure cases of lymphatic tuberculosis are quite common. In these instances the lymph-nodes and the spleen are the most frequent sites of the disease, the liver becoming involved later. Generally cases of lymphatic tuberculosis terminate with pulmonary involvement, though sometimes otherwise, as by tubercular meningitis.

Intestines: Ulceration of the intestines is comparatively rare, the lesions usually consisting of submucosal nodules. In some cases the large intestine is thickly studded with tubercles, while in other cases these tubercles are confined to the small intestine.

Tuberculosis among primates is preëminently a rapidly progressive disease and not a self-limiting affection. Any monkey from which tubercle bacilli are being eliminated at any time is a prolific center of infection; and the practical conclusion to be drawn is that such an animal must of

necessity be isolated from other animals the moment the existence of tuberculosis is discovered.

From our observation of this disease as seen among primates we are fully convinced that in the majority of cases the disease has been contracted before the animals reach the park; contracted under the unfavorable conditions usual in the quarters of animal dealers, or under the still more unhygienic surroundings prevailing in transit. The primary infection takes place, generally, in the cervical and bronchial lymph-nodes, and extension of the disease usually follows as metastases from these foci.

Pulmonary tuberculosis is by far the most frequent form of the disease, but other types are also observed. Several cases of typical primary intestinal tuberculosis have been met with; and pure cases of lymphatic tuberculosis are even more frequent. In these instances the lymph-nodes are the most frequent sites of the disease, the liver becoming involved later.

Generally cases of lymphatic tuberculosis terminate with pulmonary involvement, though sometimes otherwise, as by tubercular meningitis.

Since 1903 tubercular diseases among the wild animals in the New York Zoölogical Park have played a very unimportant part in the death-rate. This is due to—(1) the careful selection of the animals purchased; (2) the hygienic buildings in which they are quartered; (3) the rigorous exclusion of all animals known or suspected to be tubercular from the cages of the uninfected; and (4) at the first signs of the disease in any of the animals separating them from the healthy, the cages washed and thoroughly disinfected after the removal of such animals, and before healthy ones are placed in these compartments.

Our quarantine system, whereby all new arrivals are isolated for a short period and carefully observed before being placed on exhibition, has given excellent results. Of the nine cases of tuberculosis occurring among the primates last year, six of these died, or were destroyed, while under quarantine control, and previous to their admission to the exhibition halls. Numerous monkeys have died showing advanced pulmonary tuberculosis within a few days after their arrival. These cases were often animals that had been in captivity in private homes for some time and were received at the park as gifts.

All measures regarding sanitation, ventilation, and sunlight were matters of first consideration in the planning of the Zoölogical Park buildings, and the frequent routine and thorough disinfection of buildings, dens, and cages has been a great factor in keeping the park animals comparatively free from tuberculosis and other contagious diseases.

TABLE SHOWING THE ANATOMICAL DISTRIBUTION OF TUBERCULAR LESIONS IN ANIMALS EXAMINED IN THE NEW YORK ZOÖLOGICAL PARK DURING THE PAST SEVEN YEARS.

NUMBER OF TIMES LESIONS WERE PRESENT IN THE VARIOUS STRUCTURES.

Lungs.	Spleen.	Liver.	Kidney.	Cervical and Bronchial Lymph-nodes.	Mesenteric Lymph-nodes.	Intestine.	Meninges.	Bones.	Larynx.
107	81	64	57	74	60	19	2	2	2

Number of animals, July 1, 1908, 118.

In this list are included chimpanzees, orang-utans, and gibbons of the anthropoid apes; various old-world monkeys and baboons, as well as lemurs from Madagascar. There are 19 species represented.

La tuberculosis en los animales en cautividad.—(BLAIR.)

Mis estudios sobre tuberculosis se han limitado á los animales de la colección de primados.

Lesiones: El caracter general de las lesiones en la tuberculosis simia corresponde muy estrechamente á los de la humana, y el bacilo encontrado se asemeja también morfológicamente á los de la infección humana.

Las lesiones tuberculosas de los monos son muy extensas, prácticamente cada órgano en el tórax y el abdomen se ha encontrado invadido por la enfermadad.

Pulmones: Los pulmones están comunmente afestados por la forma de tuberculosis miliar ó nodular. La ausencia de hemorragia pulmonar en los monos, es un hecho sorprendente que se explica por el hecho de que en la forma de tuberculosis miliar la destrucción del tejido y la ulceración son muy limitadas.

Las cavidades pulmonares son excesivamente raras en los monos. Las lesiones tuberculosas crónicas son también menos frecuentes en los monos, y los pronunciados cambios fibrosos de la tuberculosis pulmonar nunca ha sido observado por mí en estos animales. Tampoco he encontrado lesiones cicatrizadas en los tejidos como en el hombre.

Hígado: La infección del hígado por el bacilo tuberculoso da lugar á tubérculos miliares, algunas veces areas caseosas de varios tamaños que muestran extensas caseificaciones. En un organután, encontré numerosas cavidades tuberculosas pequeñas á traves del hígado.

Riñones: La infección de los riñones presenta las características de la tuberculosis miliar observada dondequiera. En ocasiones una gran parte de un riñon ó el órgano entero está convertido en una sustancia caseosa.

Glándulas linfáticas: Casos claros de tuberculosis linfática son muy comunes. En estos casos los nudos linfáticos y el bazo son los sitios mas frecuentados por la enfermedad, siendo el hígado afectado más tarde.

Intestinos: La ulceración de los intestinos es relativamente rara, las lesiones comunmente consisten en nudos en la submucosa, en algunos casos el intestino grueso está repleto de tubérculos, mientras que en otros los tubérculos están limitados al intestino pequeño.

La tuberculosis entre los primados es una enfermedad rápidamente progresiva preminentemente, y no una afección limitada.

De neustras observaciones sobre esta enfermedad entre los primados, hemos sido convencidos de que en la mayoría de los casos la enfermedad ha sido contraída antes de llegar los animales al Parque. La infección de los primarios tomo lugar, generalmente, en los nudos linfáticos cervicales y bronquiales.

La tuberculosis pulmonar es con mucho la forma más frecuente de la enfermedad. Me ha encontrado con varios casos típicos de tuberculosis intestinal primitiva; y claros casos de tuberculosis linfática son aun más frecuentes.

Los casos de tuberculosis linfática generalmente terminan con una complicación pulmonar aunque algunas veces con una meningitis tuberculosa.

Las enfermedades tuberculosas entre los animales salvajes del Parque Zoologico de New York, desde 1903 juegan una parte poco importante en la proporción de la muerte. Esto se debe (1) á la cuidadosa selección de los animales comprados; (2) los higiénicos edificios en los cuales están alojados; (3) la rigurosa seclusión de todo animal que se sabe ó se sospecha estar tuberculoso, sacándolo de la jaula de los no infectados, y (4) al primer signo de enfermedad en cualquier de los animales que lo separa de los buenos, las jaulas se lavan y desinfectan completamente al cambiar dichos animales y antes de que los buenos la ocupen de nuevo.

Nuestro sistema de cuarentena, ha dado excelentes resultados. De los nueve casos de tuberculosis que ocurrieron entre los Primados el año último, seis de ellos murieron, ó fueron destruidos, mientras estaban en cuarentena, previa á su admisión en los salones de exhibición.

Todas las medidas concernientes á sanidad, ventilación y luz del sol fueron asunto de primera consideración al hacer los planos ie los edificios dal Parque Zoologico, y la frecuente rutina y completa desinfección de estos edificios; pozos y jaulas han sido un gran factor en la conservación de los animales del Parque comparativamente libres de tuberculosis y otras enfermedades contagiosas.

La Tuberculose parmi les Bêtes Fauves en Captivité.—(BLAIR.)

Lésions: Le caractère général des lésions dûes à la tuberculose simienne ressemble beaucoup à celui des lésions tuberculeuses humaines et les bacilles trouvés ressemblent aussi morphologiquement à ceux de l'infection humaine.

Les lésions tuberculeuses chez les singes sont très étendues, car presque chaque organe du thorax et de l'abdomen peut être envahi par la maladie.

Poumons: Les poumons sont d'habitude affectés par la forme miliaire de la tuberculose. L'absence d'hémorrhagies pulmonaires est remarquable, et on l'explique par le fait que, dans la tuberculose miliaire, il n'y a que très-peu de destruction du tissu et très-peu d'ulcération. Les cavernes pulmonaires sont excessivement rares chez les singes. Les lésions chroniques tuberculeuses sont aussi beaucoup plus rares chez le singe et je n' y ai jamais vu les changements fibroïdes si prononcés chez l'homme. Je n'ai pas trouvé non plus des lésions guéries, comme on en trouve chez l'homme.

Foie: L'infection tuberculeuse du foie se présente sous la forme de tubercules miliaires; quelquefois on voit des parties caséeuses de différentes grandeurs. Dans un orang, je trouvai de nombreuses cavités tuberculeuses de petites dimensions, disséminées dans le foie.

Rein: L'infection du rein présente le tableau habituel de la tuberculose miliaire, comme on l'observe dans d'autres organes. Rarement, une grande portion ou même l'organe entier est transformé en substance caséeuse.

Glandes lymphatiques: Des cas simples de tuberculose lymphatique sont très communs. Dans ces cas, les glandes lymphatiques et la rate sont les sièges les plus fréquents de la maladie; car le foie ne s'infecte que plus tard.

Intestins: L'ulcération des intestins est comparativement rare, les lésions consistant d'habitude en tubercules sous-muqueux; dans certains cas c'est le gros intestin qui est infecté de la sorte, dans d'autres cas la maladie ne dépasse pas l'intestin grêle.

La tuberculose des singes est une maladie qui fait des progrès rapides et point une affection qui s'arrête d'elle-même.

Nos observations nous ont convaincu que, dans la majorité des cas, les singes avaient contracté la maladie avant d'arriver à notre parc. L'infection primaire a lieu, en général, dans les ganglions cervicaux et bronchiques.

La tuberculose pulmonaire est de beaucoup la forme la plus fréquente de la maladie, mais on observe aussi d'autres types. On a vu quelques cas de tuberculose intestinale primaire et on rencontre encore plus souvent des cas de pure tuberculose lymphatique.

Depuis 1903, la tuberculose n' a joué qu' un rôle peu important parmi les causes de la mort des animaux sauvages entretenus dans le parc zoologique de New York. Ce fait est dû: (1) au soin qu'on met à choisir les animaux achetés, (2) à l'hygiène qui prédomine dans les bâtiments où ils sont logés,

(3) à l'exclusion rigoureuse de toutes bêtes tuberculeuses ou suspectes, des cages des animaux non-infectés, (4) aux mesures prises dès qu' un des animaux montre les premiers signes de la maladie: isolement, et puis, nettoyage et désinfection à fond des cages qui avaient appartenu à l'animal malade.

Notre système de quarantaine, par lequel tous les animaux nouvellement acquis sont isolés pour quelque temps et soigneusement observés avant de les exposer au public, a donné des résultats excellents. Sur les neuf singes qui avaient la tuberculose pendant l'année dernière, six moururent ou furent tués pendant l'isolement de la quarantaine et avant d'être admis aux salles de l'exposition.

Dans les plans de construction des bâtiments du parc zoölogique, les premières choses considérées furent les mesures hygiéniques, la ventilation, la lumière solaire. La désinfection des bâtiments et des cages, faite si fréquemment, a été le facteur le plus important qui a aidé à tenir la tuberculose et les autres maladies contagieuses loin des animaux du parc.

OBSERVATIONS UPON MONKEYS OF THE PHILADELPHIA ZOÖLOGICAL GARDEN AFTER INJECTION OF KOCH'S OLD TUBERCULIN.

By Drs. C. Y. White and Herbert Fox,
Philadelphia.

Results of Tuberculin Tests in Monkeys in the Philadelphia Zoölogical Gardens.

Introduction.—We have not thought it necessary to review the general literature on the subject of injections of tuberculin for diagnostic purposes. Much has been written on this subject in regard to both human beings and domestic animals. Comparatively little, however, have we been able to find on the use of this valuable test applied to wild animals. The opportunity has presented itself to us to follow out the test in the monkeys of the Zoölogical Gardens of Philadelphia while we were serving in the capacity of pathologists. We present in the following paper the result of our observations on tuberculin as a diagnostic agent in these animals.

The use of this test was started in 1905, and has been continued to the present. It had been noted in Philadelphia that the average life of a common monkey on exhibition varied between eighteen and twenty-one months. It has been found upon examination that the great majority of these animals died of tuberculosis. What is true in Philadelphia is likely true in the zoölogical gardens in other parts of the world. This high mortality from tuberculosis led us to adopt some measures to prevent the admission of infected animals and to isolate those already diseased. To accomplish this end the value of the tuberculin test was tried. We began this testing upon the stock of monkeys then on exhibition, but very soon found that these were in the advanced stage of tuberculosis and our results were far from satisfactory. It was decided by the officers of the Zoölogical Society that the infected stock should be destroyed, the monkey house thoroughly cleaned and disinfected, and thenceforth to place on exhibition only those monkeys which had failed to react to injections of tuberculin. All incoming monkeys were therefore placed in quarantine in the laboratory and carefully studied as to their general condition. Our observations included the state of the

gastro-intestinal tract, nervousness, thirst, coughing, and the taking of the temperature.

We encountered, as might have been expected, many difficulties in the early part of this work, chief of these being the determination of the normal temperature of the monkeys. A thorough study of the normal temperature was our first task, because at that time we had no experience or literary reference to guide us.

The normal daily temperature of the monkeys at a definite time each day was a step in the right direction, but, as will be seen later on, we soon found that even with this daily temperature, very much more was to be sought. We found that the temperature of the monkeys varied with the time of day, to a certain extent with the different species; and, furthermore, that external conditions, such as room temperature, excitation, etc., had an appreciable effect upon the record. A further study of this variation showed that the monkeys' temperature fell during the night, while the highest daily temperature was in the neighborhood of 2 to 3 P. M. In other words, the normal monkey's temperature reached the highest point between 2 and 3 P. M., with a gradual fall to its lowest level, which was about 2 or 3 A. M., and then it again rose to the afternoon height.

It was also ascertained that the normal high temperature of a healthy monkey was higher by three or four degrees than that of a normal human being. This average of temperature varied with the species of monkey under observation, but was usually in the neighborhood of 101° and 102° F. at the highest point: the lowest point in these cases was about three degrees lower, and produced, as will be seen in the charts, definite curves which we have designated as the "night drop." In order to obtain the daily curve of temperature it was found necessary to make records every four hours. By doing this, the normal temperature of a healthy monkey showed a uniform curve which reached its highest point at about 3 P. M., and the lowest level at about 3 A. M. Extensive chartings of individual monkeys and the comparison of the temperature of several monkeys showed uniform curves. The temperature was taken at 7, 11, and 3, because the high and low points were at 3 P. M. and 3 A. M. respectively. It was later found that monkeys of a nervous temperament, those easily excited, and those which failed to become accustomed to the taking of temperature showed variations in the daily curves which could be explained only by the nervous state of these animals.

Details of the Present System.—The monkeys are now received in the quarantine room of the laboratory building. The attendant who has charge of them has had many years' experience with monkeys, and is familiar with their habits. He takes a very lively interest in helping to take the temperatures and in the application of the test. The animals are allowed to remain quiet in cages for some days before observations are started. Preparatory

to the injection of tuberculin, daily temperatures are taken at 3 P. M., the hour at which the highest temperature point is reached. These daily records are continued until the temperature is seen to maintain an almost even course for about ten days. We have arbitrarily adopted 1° F. as the limit of variation during the observations previous to the injections. If this variation be in the form of a saw-tooth curve, the monkey is allowed to rest for an indefinite time until the temperature becomes more regular.

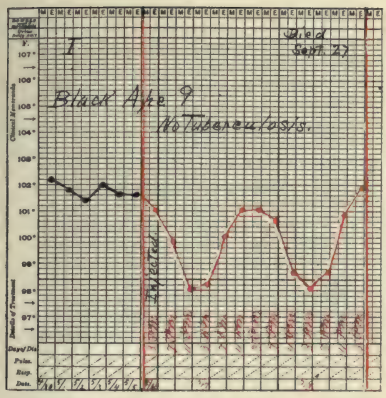
The initial record is usually high, due, no doubt, to the handling incident to the initiation of the test. After the first few days the records are lower, and follow a steadier course. The monkeys are removed from their cages with covered hands if they be small and tame, while the larger ones are caught in a net. The great majority of the monkeys readily become accustomed to this daily routine, so that by the time they are ready for the actual test little or no excitement is present. The records are made from rectal temperature in all our work. No time is lost after taking the animal from its cage in obtaining the record, so that the excitement may have as little effect as possible. The thermometer, well greased with vaselin, is inserted three inches along the anterior wall of the rectum and exposed for three minutes. If the temperature record vary several points from the previous daily record, or if there be any doubt of its correctness, it is retaken.

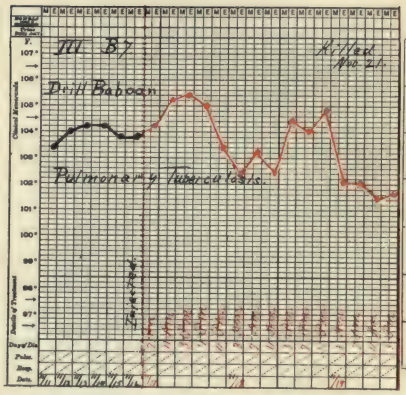
The normal height for a monkey's temperature cannot be stated with exactness compared with that of the human being. The temperature of those normal monkeys which have been killed without evidence of tuberculosis will not allow a definite statement as to the normal temperature of monkeys as a whole or of the different species. The daily temperature per rectum at 3 P. M. is most often between 101° and 102° F. Some monkeys had passed the test and still live which had an even temperature as high as 104° F. The height *per se* does not seem indicative of the condition of the monkey, unless it be quite high or low, such as 105°+ or 99°— F. These extremes are, however, usually combined with irregularity before and after the injection. Starting at the high point, 3 P. M., the temperature begins with 101° to 102° F. and gradually declines, at 7 P. M. registering 0.4° to 1° F. lower. At 11 P. M. a similar further fall is seen. The low point is reached about 3 A. M., after which a gradual rise occurs, following in reverse order the same general course as the fall during the preceding twelve hours, again reaching the high point at three in the afternoon. The average of this fall in the monkeys tested at this laboratory is 3.5° F. In a healthy monkey it may be as low as 1.8° F., or as great as 7° F. (see Chart No. 1, Black Ape, No. 9 (I.6), which shows a healthy normal four-hour temperature). The temperature of monkeys is elevated by excitement. This is well shown by Simpson and Galbraith,* who studied the temperature of normal monkeys over long

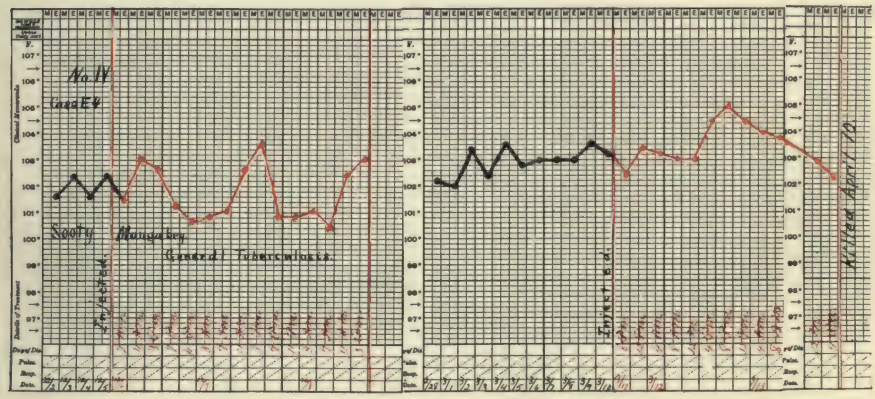
* Transactions of the Royal Society of Edinburgh, vol. xlv, p. i, p. 75, 1906.

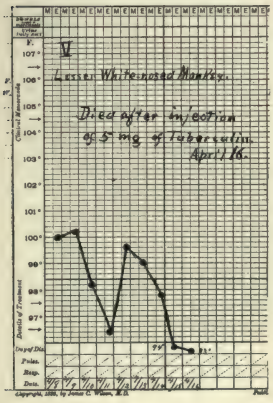
periods, and the effects of various forms of excitement. They found that the temperature was increased in direct proportion to the degree of excitement. This must be taken into consideration when observing monkeys which do not become accustomed to the excitement incident to taking the temperature. In such cases the temperature must be taken over long periods in order to obtain a definite course of the curves. Occasionally the course of the curves is so irregular that definite conclusions cannot be drawn.

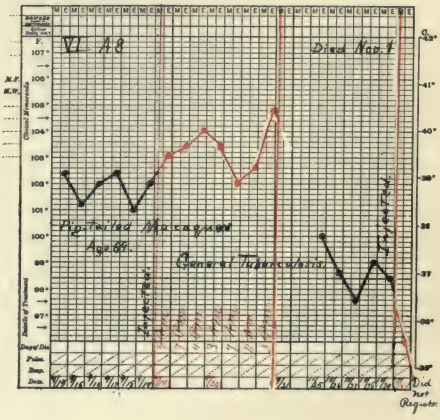
Tuberculin Test.—Preparatory to the test, the monkey is observed as above described. It has been the practice to make the injections in the forenoon to see what rise may follow at the high point on the same day. Small monkeys, such as the average common macaque, will receive 1 to 2 mg. Small capucins get ¾ to 1½ mg.; an anubis baboon or long-armed baboon may receive as high as 3 mg. This dose is rarely exceeded. It will be seen that the dosage is higher than that usually given to human beings, but considerably lower than that given to cattle. This dose was purposely made large because in our early work we found that such doses readily caused tuberculous animals to die, while it had no effect upon healthy animals. The injection is given under the loose skin of the flank. We have never seen any local reaction at the site of inoculation. The temperature is then taken every four hours (3, 7, 11, 3, 7, 11) for forty-eight hours. In the case of a normal monkey the course of the temperature curve follows exactly that described above and illustrated by Chart No. I (I.6). In some normal monkeys a slight variation may be noted in the length of the night drop immediately following the tuberculin injection. It is frequently, but not always, 0.4° to 0.6° F. lower during the first than during the second night. This is, however, not constant or marked enough to allow any diagnostic value to be put upon it. In the case of tuberculous animals the most common occurrence is a rise of temperature within twelve hours after injection. The daily curve may be entirely destroyed, the temperature following instead a course higher than indicated by the previous daily 3 P. M. record. The destruction of the daily curve, with an elevated temperature, is the most significant indication of a positive test, *i. e.*, tuberculosis. Failure to make the normal night drop in a few cases has taught us to be always doubtful of the condition, for we have found that a subsequent test will usually give a positive reaction. In some few cases, and for reasons unknown to us, the characteristic rise indicative of a positive reaction, does not take place until some time within the second twenty-four hours. In these latter cases we generally speak of the reaction as a "delayed reaction." This delayed reaction has the usual characteristics of a positive test. Here a case may be cited in point. White-throated cebus, No. 27 (D. 7) (see Chart No. II), showed the temperature series taken many times from September, 1905, to January, 1906. The course was very irregular at first and he was not in-


I
Died Sept. 27
Black Ape 9
No Tuberculosis.
Injected


III B7
Killed Nov. 21
Drill Baboon
Pulmonary Tuberculosis.
Injected


No IV
Cooley
Sooty Mangabey
General Tuberculosis.
Injected
Injected
Killed April 10.


V
Lesser Whitenosed Monkey.
Died after injection of 5 mg. of Tuberculin. April 16.


VI A8
Died Nov. 1
Pig-Tailed Macaque
Age 18?
General Tuberculosis
Injected
Injected

jected until January 28, 1906. A rise of 1° F. followed the injection, but the rest of the curve was about normal. He was held over and retested March 23d, at which test the curves did not seem low enough. His temperature remained irregular during the summer while he was under observation. In November, 1906, he was tested again after a more regular period. The first day did not fall very low, but followed a regular progression until the 11 o'clock A. M. temperature on the second day, which was the high point instead of 3 P. M. There was a very irregular and shallow curve during the next twenty-four hours, and at 3 P. M. on the third day the record was 0.6° F. higher than any previous one in this course. At autopsy the only sign of tuberculosis was in the right bronchial lymph-gland, where two small progressive tubercles were found. This well illustrates the desirability of taking the temperature two days after the injection, and how minute a lesion will cause a reaction. Good charts of tuberculous monkeys after the test are seen in (B. 7 and E. 4) Charts Nos. III and IV. The temperature in advanced cases of tuberculosis may fall below the registering point of the thermometer immediately following the test. This is well illustrated by lesser white-nosed monkey (C. 2, Chart No. V) and pig-tailed macaque, No. 69 (A. 8, Chart No. VI). In both of these cases the animal died. We have occasionally noted an unusually deep night drop immediately following the injection in monkeys which were subsequently found on autopsy to be healthy. The temperature of these monkeys showed an approximately normal rhythm without a rise above the 3 P. M. high point.

The relation of the degree of reaction to the extent or severity of the lesions is a very uncertain one, and our experience allows no conclusions on this score, with the exception noted above concerning very advanced cases of tuberculosis. The case just cited (D. 7, Chart II) shows a positive reaction and only a minute trace of infection. Black ape, No. 7 Chart VII (I.2) gave a most pronounced reaction and had only a few pinhead-sized tubercles in the liver and spleen, while sooty mangabey No. 62 (E. 4), Chart IV drill, No. 5 (B.7, Chart III), gave no more marked reactions and showed advanced lesions at autopsy. Perhaps the rule is for the temperature to fall in the most active and wide-spread cases.

The number of monkeys received at the gardens and tested during the time these observations have been made is as follows: 128 monkeys received; passed, 81; condemned or died at or near the time of the first injection and not on exhibition, 47. It will be seen from this that only 63.3 per cent. of the monkeys received actually passed the tuberculin test. Of the 81 monkeys which were passed, 79 were sent to the monkey house; five died there as the result of tuberculosis. They lived one, three, eight, eight, and sixteen months. Five others were returned, retested or killed, and found tuberculous. The rest remain apparently normal to date. No monkey passed since

February, 1906, has as yet developed any sign of tuberculosis. In reviewing the charts of the monkeys dead of tuberculosis and of those associated with them in the cages, it is possible to suspect the source of infection of at least several of these animals. The total deaths from tuberculosis among monkeys which had been in the monkey house since the test was begun is ten, of which eight may with reasonable certainty be traced to two infections from cases which passed early in the tests; these temperature charts would not have been passed had we had the experience gained later. From March 1, 1907, to March 1, 1908, there were two deaths; and the last death from tuberculosis was on October 17, 1907.

The monkeys which passed the test and showed tuberculosis after being returned from the monkey house for any reason are as follows:

Sooty mangabey, No. 62, passed on forty-eight-hour temperature; returned and found tuberculous after being on exhibition three months.

Sooty mangabey, No. 63, passed on forty-eight-hour temperature; on exhibition three months; injected, gave a questionable reaction; gave a positive reaction eight months after return. The reaction on which it was passed was questionable.

Sooty mangabey, No. 60, passed on forty-eight-hour temperature which was questionable; returned in three months; eight months after return positive reaction, tuberculosis.

Grivet, No. 9, passed on questionable forty-eight-hour temperature; returned in three months; positive reaction; killed, tuberculosis.

Black ape, No. 7 (I.2), Chart VII, passed on twenty-four-hour temperature; returned in three months; gave questionable reaction; a regular daily temperature for a long time; gave a positive reaction three months after return; tuberculosis.

Monkeys dying from tuberculosis in the monkey house were as follows: Drill, No. 6, passed on good forty-eight-hour temperature, died in monkey-house eight months afterward of tuberculosis.

Anubis baboon, No. 34, passed on good forty-eight-hour temperature; on exhibition sixteen months; returned and killed; tuberculosis.

Common macaque, No. 205, passed on twenty-four-hour temperature; on exhibition three months; returned; irregular forty-eight-hour temperature; tuberculosis.

Sooty mangabey, No. 59, passed on good twenty-four-hour temperature; then on forty-eight-hour temperature; after twenty months on exhibition, died of tuberculosis. (Traceable to five days' exposure to sooty mangabeys, Nos. 60, 62, and 63.)

Grivet monkey, No. 8, passed on twenty-four-hour temperature; one month on exhibition; returned, tuberculous.

The following is the list of monkeys which were tested early in our work.

Typhoid fever.
Inoculated.
Inoculated.
Killed Nov. 13. '07.

Typhoid fever.
Inoculated.
Killed Nov. 13. '07.

Their temperature was taken after the injection for only twenty-four hours. Of these fourteen monkeys, six died of tuberculosis, some of which were included in the above lists. Seven of the fourteen were retested on the basis of a forty-eight-hour temperature after injection, and six of these were negative to the test, while the remaining one gave a positive reaction. This determined for us the necessity of taking the temperature for forty-eight hours at least following the injection.

Passed on Twenty-four-hour Temperature.

C—3, 8:15: '05, Remaining
A—3, 8:15: '05, "
B—4, 8:31: '05, "
B—5, 8:31: '05, "
} Retested at monkey house, forty-eight-hour temperature, passed.

Have been at the monkey house three years one month since passing twenty-four-hour test.

Died, Not Tuberculous.

B—3, Passed on twenty-four-hour temperature; retested at monkey house, forty-eight-hour temperature and passed; on exhibition two years five months; died, not tuberculous.

I—1, Passed on twenty-four-hour temperature; retested at monkey house, forty-eight-hour temperature, repassed; on exhibition one year ten months; died, not tuberculous.

I—4, Passed on twenty-four-hour temperature; on exhibition two months; died, not tuberculous.

A—26, Passed on twenty-four-hour temperature; on exhibition twenty-one days; died, not tuberculous.

Died, Tuberculous.

B—2, Tested, twenty-four-hour temperature; died, general tuberculosis.

A—2, Tested, twenty-four-hour temperature; died, general tuberculosis.

A—4, Passed, twenty-four-hour temperature; died, tuberculous.

A—6, Tested, twenty-four-hour temperature; died, general tuberculosis.

C—7, Tested, twenty-four-hour temperature; died, general tuberculosis.

I—2, Passed, twenty-four-hour temperature; retested at monkey house; returned on forty-eight-hour temperature; again tested (forty-eight hour temperature), killed; general tuberculosis.

No monkeys condemned on twenty-four-hour temperature.

Conclusions.—1. Tuberculosis is a disease which causes a considerable mortality among monkeys. The habits of the animals, moreover, facilitate the transmission when many are together on exhibition.

2. The primary object of this work was to protect the healthy monkeys by separation of the infected ones. It was therefore diagnostic work, and the use of tuberculin for therapeutic purposes was not tried.

3. It is not possible to trace the source of infection, whether from human beings or from the lower animals. From the number of monkeys that were

condemned upon the first test it was evident that a large percentage are affected while in the hands of the dealers.

4. To insure the protection afforded by the test the exhibition house must be freed of infected animals, disinfected, and only non-tuberculous monkeys admitted. The monkeys on exhibition should be retested at least once a year and doubtful animals removed from the cages.

5. To apply the test scientifically, a thorough familiarity with the normal temperature of the monkeys is necessary.

6. The normal temperature of the monkey is higher than that of the human being by 4° to 5° F. at its highest point. It follows a regular curve during the twenty-four hours, with the high point at 3 P. M., in the neighborhood of 101° to 102° F., its lowest level, about 99° F., at 3 A. M.

7. An injection of tuberculin into a non-infected monkey will not disturb this rhythm.

8. An injection of tuberculin into an infected monkey will cause a definite rise in temperature, a destruction of the daily curve, the performance of a course higher than the daily temperature at the previous high point, or any or all of these.

9. By the test we have been able to detect tuberculosis in 47 (37 per cent.) out of 128 monkeys tested.

10. No monkey which has passed the test, *i. e.*, given a negative reaction, since February, 1906, has shown as yet any evidence of tuberculosis, although some have died from other causes, and others have been killed upon suspicion.

11. Ten of the 79 monkeys which were passed were subsequently found tuberculous, either in the exhibition cages or after having been returned to the laboratory for any reason. These infections are traceable to two monkeys which passed the test because of a misinterpretation of their temperature after injection during our early work.

12. By careful consideration of the temperature; by rigid adherence to hygienic measures in quarantine; and by observation of the individual peculiarities of the animals, the tuberculin test will prove an efficient means of separating infected monkeys and preserving exhibition collections.

The investigations here reported were made possible by the broad-minded interest and coöperation of the directors of the Zoölogical Society of Philadelphia, and the writers wish to acknowledge with thanks the assistance of Dr. Arthur Erwin Brown, secretary of the Society, in their work.

Injected ead.
Killed Jan. 18.

Injected
Injected
Injected

THE OCCURRENCE AND SIGNIFICANCE OF TUBERCLE BACILLI IN THE FECES OF TUBERCULOUS CATTLE.

By E. C. Schroeder,

Superintendent of the Experiment Station at Bethesda, Md., of the United States Bureau of Animal Industry.

Dairy products have the distinction among articles of food that they are eaten in a raw state more frequently than other substances derived from animals. In addition to this they are among the most widely used of all food products, and some of them—milk, cream, and ice-cream—are commonly eaten so shortly after they have been in contact with the animals, and the possibly infected environment of the animals, from which they are obtained that an insufficient interval of time elapses between their production and use for the disease-causing organisms with which they may have become infected to die or undergo a reduction of pathogenic virulence.

The commonest disease, alike of persons and dairy cows, is tuberculosis, and the commonest location of the disease is in the bodies of persons and dairy cows. Relative to the frequency with which persons and dairy cows are affected with tuberculosis they are more nearly alike than either is like any other animal species, though most species suffer with tuberculosis to some extent.

A proper valuation of these plain facts must engender the conviction that it is imperatively necessary for the protection of public health, in the light of our present knowledge of tuberculosis, to know how tubercle bacilli are expelled by dairy cows and how they may be introduced into dairy products. It is this conviction that serves as my reason for presenting the following paper on the occurrence and significance of tubercle bacilli in the feces of tuberculous cattle.

Microscopical examinations, supplemented by other tests, made at the experiment station of the United States Bureau of Animal Industry, demonstrated that many seemingly healthy tuberculous cattle expel virulent tubercle bacilli from their bodies per rectum with their feces.

Twelve tuberculous cows were collected from several dairy herds and kept under observation about two years. They were in excellent general condition and had no visible symptoms of disease; they were not known or sus-

pected to be tuberculous until they were tested with tuberculin, and prior to their removal from the dairy herds to which they originally belonged their milk was regularly sold to city consumers.

During the first two months microscopical examinations revealed that 5, or 41⅔ per cent., of the cows were intermittently expelling acid-fast bacilli per rectum; eighteen months later the number had increased to 10, or 83⅓ per cent.; that is, it had doubled, though the majority of the cows still retained their apparently good condition and showed no symptoms of tuberculosis.

At first it was difficult to find the bacilli in the feces; with most cows it was necessary to make daily microscopical examinations for a week or more, in one instance for several weeks, before they were found. That is to say, the intervals of time between the occurrence of the bacilli in numbers large enough to serve for their detection in the feces of individual cows were comparatively long. Later the intervals were shorter; the feces of some cows remained constantly infected, and the number of bacilli in proportion to the mass of feces was greater.

The method used in the microscopical examinations is simple. Thin films of fresh feces were spread on cover-glasses, permitted to dry thoroughly, fixed by drawing the cover-glasses through the flame of an alcohol lamp, stained with Ziehl-Neelson carbol-fuchsin, decolorized with 20 per cent. sulphuric acid, restained with Löffler's methylene-blue solution, and mounted in Canada balsam.

Microscopical examinations of the feces from a smaller number of seemingly healthy cows, of which it was known through the agency of tuberculin that they had been affected with tuberculosis three years or longer, showed that all were passing acid-fast bacilli per rectum, in most instances intermittently, but in some continuously, day after day. The same was found to be true of a small number of visibly affected tuberculous cows.

The distribution of the bacilli, as a rule, was fairly even throughout the entire mass of feces, though in advanced, long-standing cases of tuberculosis it was possible at times to pick out shreds of mucus that were very heavily infected.

As tubercle bacilli have no sufficiently marked tinctorial or microscopical peculiarities to distinguish them absolutely from all other acid-fast bacteria, it is necessary to briefly outline the evidence on which the conclusion is based that the acid-fast bacteria under consideration are certainly tubercle bacilli, and not other, less important, and possibly harmless microörganisms:

1. Numerous microscopical examinations of feces from a large number of non-tuberculous cattle, stabled, fed, etc., under practically the same conditions as those affected with tuberculosis, in no instance revealed acid-fast bacilli that could be mistaken for tubercle germs.

2. Guinea-pigs inoculated with small masses of fresh feces, from several different tuberculous cows that were passing acid-fast bacilli per rectum, as a result of the inoculations, contracted typical, generalized, fatal tuberculosis.

3. Guinea-pigs inoculated with milk carefully drawn from healthy cows in a healthy environment and afterward soiled with small masses of fresh feces from tuberculous cows that were passing acid-fast bacilli per rectum, and guinea-pigs inoculated with butter made from such milk, as a result of the inoculations became affected with typical, generalized, fatal tuberculosis.

4. A number of hogs, confined in a yard of about ½ acre area, into which the manure from a stable containing a herd of tuberculous cows was thrown, became affected with tuberculosis.

5. Several hogs, first tested with tuberculin to prove them free from tuberculosis, were fed freshly collected feces from cows that were passing acid-fast bacilli per rectum. The hogs contracted typical generalized tuberculosis. The feces for the latter test were collected while the cows were temporarily confined in a non-tuberculous environment, in narrow, high-walled stalls, and were removed from the cows immediately after they were passed. The hogs were confined in pens in which no case of spontaneous tuberculosis has ever occurred, though the same pens were used at various times for hundreds of other hogs.

6. Pure cultures of tubercle bacilli were isolated from the organs of guinea-pigs that became affected with tuberculosis as the result of inoculations with feces from cows that were passing acid-fast bacilli per rectum; and, finally, the virulence of such pure cultures was proved by inoculating cattle subcutaneously with them. The cattle became affected with typical, progressive tuberculosis, which, in one instance, terminated in death three months after the inoculation was made.

It may be interesting to know that the tuberculous lesions in the cattle inoculated subcutaneously with pure cultures of tubercle bacilli derived from bovine feces were located mainly in the lung and the thoracic lymph-glands. The lesions in the animal that succumbed three months after inoculation were most extensive in the dorsal portion of the lung, or that portion which, in cattle, relative to the regions where tuberculous processes more commonly have their beginning than elsewhere, may be compared to the apices of the human lung.

Though only a small number of cattle of which it was known that they expelled tubercle bacilli per rectum during life have been examined post-mortem, it is reasonably certain that the infection of the feces is due in most instances to pulmonary lesions that are in more or less direct communication with bronchial tubes. Several cows with heavily infected feces were affected with fairly generalized tuberculosis of the thoracic and abdominal organs, without lesions, however, of the intestinal wall or the mucosa lining the diges-

tive tract. All cows passing tubercle bacilli per rectum examined after death had pulmonary lesions from which material was being discharged into bronchial tubes. In one case the lesions were quite small and entirely confined to the lung and the thoracic lymph-glands. Among the various cattle examined, only one was found with which the infected character of the feces could doubtfully be referred to lesions of the intestinal mucosa, and even in this case it was inpossible to prove that the suspected lesions, which consisted of a few small, ulcer-like erosions on the intestinal mucosa, were certainly tuberculous. This animal was affected, in addition to the intestinal disease, with advanced generalized tuberculosis, and the condition of its lung justifies the view that a sufficiently abundant infectious material was coughed up and swallowed to thoroughly infect the entire intestinal contents.

The even distribution of the tubercle bacilli in the feces can well be explained by the long agitation and mixing to which the material that leaves the body per rectum is subjected on its way through the digestive tract, and hence this distribution is in harmony with the conclusion that the tubercle bacilli expelled in the feces commonly have their origin in the lung. This view is also supported by the following experiment: A healthy cow was given a small amount of tubercle culture in her drinking-water daily for several weeks; she was confined in a small stable which was divided into two compartments by a solid board partition; a narrow slit in the partition fitted about her neck; hence her head was in one compartment and her body in the other, so that no material could be transferred externally from her head to her body. The culture of tubercle bacilli used was of a pathogenic virulence too low to cause tuberculosis in cattle. The bacilli soon appeared in the feces, in which they were quite evenly distributed. It was proved by inoculation tests that the bacilli had undergone no determinable loss of virulence for guinea-pigs by their passage through the digestive canal of the cow.

When milk of the kind regularly sold by dealers is purchased under ordinary market conditions, and placed in the tubes of a small centrifuge, and rotated fifteen minutes at the rate of 2000 revolutions per minute, a varying amount of solid matter collects as sediment. When this sediment is examined microscopically, not more than 1 among 50 samples is found to be entirely free from particles of vegetable matter, identical in appearance with minute fragments of bovine feces. Roughly estimated, the average amount of such contamination in the market milk examined was 1 part in 4000, but some samples contained fully 1 part of cow-dung to every 400 parts of milk.

On its face this is a disgusting condition, but it is unfortunately more dangerous than its superficial appearance indicates. The solid impurities that reach the consumer in milk are often only a fraction of the total solid impurities with which it has actually been in contact. Larger masses of feces and other substances that drop into the milk-pail, or are splashed,

sprayed, or otherwise introduced into it, are removed from the milk by the straining to which it is subjected before it is poured into the containers in which it is sold. Only those solid impurities that are small enough to pass through the strainer reach the consumer.

What this means relative to the frequency with which milk will be contaminated with tubercle bacilli when it is obtained from tuberculous cows, or from healthy cows stabled and milked together with tuberculous cows, is a subject on which it is hardly necessary to enlarge, if we bear in mind in this connection that the even distribution of tubercle bacilli in the feces of tuberculous cattle signifies that each cow of average size, on the days when her feces are infected, contributes about 30 pounds of infected material to her environment.

No firm union exists between the feces of cattle and the tubercle bacilli they contain. The bacilli are present in an easily detached condition; they are too small to be strained out of milk, and they are probably washed free from the feces in milk. In a test made regarding this matter it was found, when guinea-pigs were inoculated with normal, fresh milk, to which feces from tuberculous cattle had been added, in no greater amounts than are commonly seen in unstrained dairy milk, that those among the guinea-pigs inoculated with milk after it had been strained contracted tuberculosis as frequently and succumbed as rapidly as those inoculated with the same milk before it was strained.

That the amount of foreign matter which collects as sediment in the tubes of a centrifuge cannot be regarded as a sufficient test for the amount of feces with which milk has been in contact is shown by the fact that, among the samples of milk examined relative to fecal contamination, a number were found with little or no vegetable sediment, but which yielded cream in the tubes of a centrifuge discolored precisely like the cream obtained from milk to which quite large quantities of feces were intentionally added.

Investigations made at the experiment station on the physical conduct of tubercle bacilli in milk proved conclusively that they rise with cream, irrespective of whether it is separated from milk slowly or rapidly, as freely as they sink with sediment. The coherence between cream globules and bacteria is so tenacious that it cannot be overcome by the ordinary processes to which milk is subjected. Hence, when tubercle bacilli are introduced into milk with feces the cream obtained from the milk will be infected with tubercle bacilli. Butter made from such cream will also contain tubercle bacilli; this was demonstrated by making butter from such cream and testing it with guinea-pig inoculations.

In ordinary salted butter tubercle bacilli remain alive and retain their virulence one hundred and sixty days or longer, and show no positively determinable loss of virulence in ninety days or three months. Mohler, of

the United States Bureau of Animal Industry, Division of Pathology, proved that tubercle bacilli remain alive and virulent in butter kept under ordinary commercial conditions at least one hundred and fifty-three days.

As the work of the experiment station on the long-retained virulence of tubercle bacilli in butter has been adversely criticized, from the popular point of view, because the tests were made by inoculating and not by feeding guinea-pigs, it seems worth while to record the following feeding experiment:

Four hogs, weighing about 125 pounds each, were tested with tuberculin to prove them free from tuberculosis, and were then confined in carefully disinfected pens and fed small amounts of butter made from the milk of a cow affected with udder tuberculosis. Two of the hogs were fed butter salted at the rate of one ounce of salt to the pound of butter, and two received unsalted butter. At the time the butter was fed it was three months old or older; each hog received one ounce daily, and the feeding was continued one month, so that each hog received in the course of the month, in addition to its regular food, a little less than two pounds of butter; that is, probably a smaller amount than is usually eaten by persons of the same weight.

Several months after the feeding the hogs were killed and examined postmortem, and the two that had eaten the salted, and one of the two that had eaten the unsalted, butter were found to be affected with tuberculosis. Curiously, it was one of the two hogs fed unsalted butter that remained well, and the disease was more advanced in the two hogs that received salted than in the one that became affected from the unsalted butter. This phenomenon may be explained by the assumption that the salt harmed the tubercle bacilli in the butter less by its direct action on them than it favored their preservation by retarding the growth of other bacteria.

Several hogs kept under the same conditions as the foregoing, without being fed infected butter, were found, when killed and examined after death, to be free from tuberculosis.

More conclusive evidence to show that tubercle bacilli may live and retain their virulence at least three months in salted butter would be difficult to obtain.

The various facts presented clearly seem to justify the following conclusions:

1. Tuberculous cows, wholly free from visible symptoms of tuberculosis, frequently expel tubercle bacilli from their bodies per rectum.

2. Tubercle bacilli in the feces of tuberculous cows are not dependent upon intestinal tuberculosis, but commonly have their origin in the lung.

3. Tubercle bacilli in the feces of tuberculous cows are evenly distributed throughout the entire mass, and hence the amount of infected material in the environment of tuberculous cows is very large.

4. Tubercle bacilli in the feces of tuberculous cattle are well separated

and easily detached, hence when infected feces get into milk, the bacilli are washed free from the particles of feces and remain in the milk, as they are too small to be strained out of it.

5. Since the feces of cattle are a common, almost universal, impurity in milk, the presence of tubercle bacilli in the feces of tuberculous cows makes it practically impossible to obtain milk at all times free from tubercle bacilli either from tuberculous cows or in the environment of tuberculous cattle.

6. As tubercle bacilli in milk are freely transferred to the cream separated from it, and as tubercle bacilli in cream are transferred to butter in the manufacture of which it is used, we must conclude that the presence of tubercle bacilli in the feces of tuberculous cows is an important cause for the frequent infection of all dairy products obtained from tuberculous cows or from cows exposed in the environment of tuberculous cattle.

7. As the interval of time that elapses between the production and use of milk, cream, and ice-cream is very short, and as tubercle bacilli in butter retain their virulence for long periods of time, the presence of tubercle bacilli in the feces of tuberculous cows signifies that, while we continue to use raw milk from tuberculous dairy herds, live, virulent tubercle bacilli will be distributed far and wide in a way that insures their entrance into the bodies of persons of all ages.

Now, let us bear in mind that from 15 to 30 per cent. of our dairy cows are affected with tuberculosis; that the examination of over 300 samples of milk from the local market showed that 5½ per cent., or 1 in 18, contained virulent tubercle bacilli, notwithstanding that the best available data indicate that the tuberculous condition of the local dairy herds is not as bad as that of the herds supplying milk to most other eastern cities of the United States, and certainly not as bad as the condition of the herds from which European cities obtain their dairy products, and it will become evident that the tuberculous cow is, by herself, a sufficient source of virulent tubercle bacilli to account for the infection of the whole human race.

For those who contend that tubercle bacilli from the bovine source are of no great importance for public health, I wish to direct attention to the fact that the investigations of the United States Bureau of Animal Industry alone, though they do not stand alone in this respect, supply strong evidence for the conclusion that the tubercle bacillus is a polymorphic organism, the immediate morphology of which depends upon some not yet clearly defined element in its environment.

Mohler and Washburn, of the Bureau Division of Pathology, after lengthy investigations and a careful study of the literature, concluded that the variability of the tubercle bacillus is one of its marked peculiarities. They converted tubercle bacilli from a bovine source, of the bovine morphological type, into tubercle bacilli of the morphological type known as human, by

growing them on solidified human blood-serum, and they repeatedly converted bovine types into what may be called extreme human types, by passing them through the bodies of cats.

If it is possible to convert bovine types of tubercle bacilli into human types by growing them in a test-tube on solidified human blood-serum, or by passing them through the bodies of cats, it is reasonable to assume that a similar conversion from one type to the other occurs in the human body. If this assumption is as true as it seems reasonable, the two following facts are very significant relative to the source from which the tubercle bacilli that infect persons are derived.

1. The comparatively greater frequency with which tubercle bacilli of the bovine morphological type are isolated from children, in whom the tuberculous processes are of an acute rather than a chronic character, than from adults.

2. The greater virulence of tubercle bacilli of the bovine type from bovine sources for all species of animals, including the quadrumana.

In our fight against tuberculosis we must consider all the sources from which tubercle bacilli are disseminated, and though I do not wish to give the impression that I believe the bovine source to be of more importance than the human, I am thoroughly convinced that it is one of the very important sources, and that the facts as we know them to-day warrant the following general conclusion:

It is imperatively necessary for the protection of public health that all milk should be obtained from cows certainly free from tuberculosis, and from cows stabled, milked, and pastured in an environment free from tuberculous infection, or that it should be pasteurized or sterilized before it is used as food in any form.

La Occurrencia y Significacion del Bacilo de la Tuberculosis en el Excremento del Ganado.—(SCHROEDER.)

Como 40% del ganado aparentemente en buena salud, y que se sabe que son tuberculosos por haber dado una reacción positiva á la tuberculina, intermitentemente descargan bacilo de la tuberculosis en los excrementos. Cuando un cierto numero de estos animales es guardado bajo una observacion constante el por ciento de bacilos que pasan con los excrementos es casi el doble despues de 18 meses y la frecuencia con la cual el bacilo se encuentra en el excremento del animal y el numero de ellos relativos a la masa de excremento que pasa el animal tambien aumenta. Entre 12 vacas 5, o sea 41⅔%, fueron encontradas que descargan el bacilo de la tuberculosis por el recto; gradualmente antes del termino de dos anos el numero habia aumentado a 10, o sean 83⅓%.

La prueba da que estos bacilos encontrados en el examen microscópico fueron el bacilo de la tuberculosis, se demostró por medio de las inyecciones hechas en los cobayos lo cual produjo una tuberculosis generalizada en los animales inyectados con los excrementos en los cuales se encontraron estos bacilos; tambien la tuberculosis fue producida en el cerdo cuando á estos se les alimentó con el excremento de estos animales, lo mismo la afección fue producida en los cobayos injectados con leche al cual habie sido primeramente infectada con los excrementos. Culturas del bacilo de la tuberculosis aislado de los cobayos produjo una tuberculos fatal en el ganado despues de una inoculacion subcutánea.

El examen de las leches en el mercado demuestra que esta es raramente libre de la contaminación del excremento del ganado como regla general; por lo tanto uno puede concluir que la prevalencia de la tuberculosis en las vacas lecheras y la occurrencia común del bacilo de la tuberculosis en el excremento de las vacas tuberculosas, es una prueba que el bacilo de orígen bovino, en una condicion fresca y violenta tendrá una extensa distribución y por lo tanto sobrado oportunidad para entrar en el organismo del hombre.

La presencia del bacilo de la tuberculosis en la leche significa, que ha sido demostrado en el bacilo, tambien se encuentra en la nata y en la mantequilla que se obtiene de esta leche, y tambien se ha demostrado que el bacilo de la tuberculosis retiene su violencia por largo tiempo; por lo tanto mientras que el uso de la leche cruda de las vacas tuberculosas sea usada bien como bebida ó en la forma de nata o mantequilla uno puede concluir que la predisposición de las personas á las formas violentas del bacilo de la tuberculosis de origen bovino es prácticamente universal.

Apparition et Signification des Bacilles de la Tuberculose dans les Fèces du Bétail.—(SCHROEDER.)

Environ 40% du bétail paraissant sains et qui sont reconnus tuberculeux seulement parce qu'ils ont réagi avec la tuberculine, laissent passer par le rectum des bacilles de la tuberculose d'une façon intermittente. Quand un certain nombre d'un tel bétail est maintenu sous une observation continuelle, on remarque que le pourcentage, de ceux qui expulsent des bacilles de la tuberculose par le rectum, double presque en 18 mois, et la fréquence avec laquelle les bacilles de la tuberculose peuvent être découverts dans les fèces de chaque animal et le nombre de bacilles relatif à la masse des fèces passées accroissent également. Parmi 12 vaches, on en a d'abord trouvé 5 ou 41⅔% qui passaient des bacilles de la tuberculose par le rectum, graduellement et avant la fin de deux ans, le nombre s'était éleve à 10, ou 83⅓%. Que les bacilles acid-fast, trouvés à l'examen microscopique soient réellement des

bacilles de la tuberculose, a été prouvé en ce qu'ils ont causé une tuberculose généralisée et fatale chez des cobayes qui avaient été inoculés avec des fèces, dans lesquelles se trouvaient des germes; en causant une tuberculose généralisée et fatale chez des cochons, nourris de ces fèces et en causant une tuberculose généralisée et fatale chez des cobayes, inoculés avec du lait souillé par de petites quantités de ces fèces et avec du beurre fait de ce lait souillé. Une inoculation souscutanée, fait sur du bétail, avec de pures cultures de bacilles de la tuberculose, provenant de cobayes préalablement inoculés avec des fèces, a provoqué une tuberculose fatale.

L'examen du lait commercial a démontré que des échantillons, complètement indemnes de toute contamination avec les fèces des vaches sont, en règle générale de rares exceptions. De lá, nous pouvons conclure que la grande propagation de la tuberculose parmi les vaches laitières et l'apparition fréquente des bacilles de la tuberculose dans les fèces des vaches tuberculeuses, nous nous convainquent, au moins, que les bacilles de source bovine dans une condition fraîche et virulente, auront une large distribution et d'une manière qui mène directement à leur introduction dans le corps humain.

La présence de bacilles de la tuberculose dans le lait a été démontrée de signifier qu'ils seront également présents dans la crème et dans le beurre obtenus de ce lait, il a aussi été démontré que les bacilles de la tuberculose dans le beurre retiennent leur virulence pendant de longués périodes de temp. On peut donc conclure que, pendant que l'emploi du lait cru provenant de vaches tuberculeuses ou de vaches maintenues dans un entourage tuberculeux soit comme boisson, soit comme source de crème et de beurre se continue, à peu près tout le monde est exposé aux bacilles virulents de la tuberculose de source bovine.

Vorhandensein und Bedeutung von Tuberkelbacillen im Rinderkoth.—(SCHROEDER.)

Ungefähr 40% anscheinend gesunder Rinder, deren Tuberkulose erst aus der Reaktion nach Tuberkulin manifest wird, setzen zeitweise mit den Fæces Tuberkelbazillen ab. Hält man eine Anzahl solcher Thiere unter constanter Beobachtung, so findet man den Prozentsatz jener, die per Rectum Tuberkelbazillen entleeren, in ungefähr 18 Monaten verdoppelt; gleichzeitig weist auch die Frequenz, mit welcher die Exkremente der einzelnen Thiere Tuberkelbazillen enthalten, sowie die verhältnissmässige Anzahl der Bazillen in einer gewissen Kothmasse eine Steigerung auf. Von 12 Kühen passirten anfänglich 5, also 41⅔%, Tuberkelbazillen per Rectum; nach und nach, innerhalb eines Zeitraumes von zwei Jahren, war die Anzahl dieser auf 10, also 83⅓%, gestiegen.

Dass die mikroskopisch nachgewiesenen säurefesten Bazillen thatsäch-

lich Tuberkelbazillen waren, wurde dadurch erwiesen, dass mit diesen bazillenhaltigen Fæces inokulirte Kaninchen, mit solchen Fæces gefütterte Schweine, sowie auch Kaninchen die mit durch geringe Kothmengen contaminirter Milch oder mit aus solcher Milch hergestellter Butter inokulirt wurden, insgesammt an allgemeiner Tuberkulose zugrunde gingen.

Aus mit solchen Fæces inokulirten Kaninchen gewonnene Reinkulturen von Tuberkelbazillen erzeugten in Rindern, wenn subkutan eingeimpft, fatale Tuberkulose.

Untersuchungen der auf den Markt gebrachten Milch erwiesen, dass Proben, die ganz frei von Contamination mit Kuhexkrementen waren, seltene Ausnahmen von der Regel bilden; es kann hieraus gefolgert werden, dass die Präponderanz von Tuberkulose in Melkkühen und das gewöhnliche Vorkommen von Tuberkelbazillen in den Exkrementen tuberkulöser Kühe zumindest so viel bewirken, dass animale Tuberkelbazillen in frischer, virulenter Form weitgehendste Verbreitung finden in einer Weise, welcher ihnen einen directen Weg zur Einführung in den menschlichen Körper eröffnet.

Das Vorhandensein von Tuberkelbazillen in der Milch garantirt erwiesenermassen dafür, das solche, auch in Sahne und Butter vorzufinden sein werden; auch ist es bekannt, dass Tuberkelbazillen in der Butter für lange Zeit virulent bleiben. Da die rohe Milch tuberkulöser Kühe oder solcher, die in tuberkulöser Umgebung gehalten werden, allgemein als Getränk oder Sahne- und Butter-Stoff benützt wird, so folgt hieraus, dass die Gefahr einer Contamination mit virulenten Rinder-Tuberkelbazillen eine tagtägliche und allgemein ist.

DISCUSSION.

Mr. Pope: I wish to call attention to the practical application of the stand taken in this paper with reference to the farmers' condition. I am surprised to learn of the great danger of milk becoming contaminated from the dirt and filth of cattle and from the careless handling of milk. How is the average American farmer to prevent exposure of his pigs and other animals? How is he to keep them from coming in contact with the disease? This is one of the points I had in mind when I spoke of the Bang system.

Dr. Bitting: I would like to modify somewhat the conclusions of Dr. Schroeder, for if the danger is as great as that indicated by the reader, not one of the workers in creameries would escape the disease. But it has been proved by my investigations of many years along this line that the disease is not more prevalent among those men than in any of the other classes.

Dr. Bebee: I wish to mention the coöperative experiments conducted with Dr. Reynolds, the results of which differ from those of Dr. Schroeder. We made microscopical examinations and inoculated guinea-pigs with the

fecal material from tuberculous cows. I believe we inoculated about 200 guinea-pigs with feces from 46 tuberculous animals. All of these animals were known to be tuberculous for two or three years before the guinea-pigs were injected. Of these animals, only one was found which excreted tubercle bacilli in the feces.

Dr. D. Arthur Hughes (Chicago): It is well known that typhoid bacilli are found in human urine, and I would like to ask Dr. Schroeder if he has conducted any experiments to determine if the urine of cattle contain tubercle bacilli.

Prof. Bang: The danger of ingesting tubercle bacilli with milk is not uniform. I want to call attention to the fact that susceptibility plays an important part in the transmission of the disease. I would also like to cite instances where avian tuberculosis was transmitted to mammals, and it is very probable that the bovine type can also be transmitted to human beings. Avian tuberculosis is considered to be very different from mammalian tuberculosis. Now, in my laboratory I, with my son, have done some experiments with feeding animals with avian tuberculosis, and we have found that cultures of avian tubercle bacilli are able to produce a bad infection of tuberculosis. At the same time, it is a very different infection. For instance, where I used a certain quantity of avian tubercle bacilli the animals died in two months. There is no doubt that bovine tuberculosis is not so different from human tuberculosis as is avian tuberculosis from mammalian tuberculosis. If avian tuberculosis is able to infect mammalia, we are obliged to think that the same would be the case with bovine tuberculosis. I would also call attention to the disease known as chronic enteritis, which is caused by an acid-fast bacillus, and in such cases the presence of the bacilli in the feces could readily be mistaken for tubercle bacilli. I would like to speak a few words regarding the presence of tubercle bacilli in the feces. This may be in many instances connected with the presence of tubercle bacilli in the milk. The investigations of Rabinowitsch show that the milk of all tuberculous animals contains tubercle bacilli, but this is not so. If the animal is not affected with open tuberculosis, there are no tubercle bacilli in the milk, and the same applies to the feces. In closed tuberculosis there are no tubercle bacilli in either the milk or in the feces. When some of the lesions open and the bacilli enter into the lymph or blood circulation, then the bacilli may be temporarily present in the milk and feces.

Prof. Heymans: The results obtained by Dr. Schroeder from the inoculation of feces into guinea-pigs are not quite conclusive. In order to prove the infectiousness of the feces for other animals inoculations should be made directly into the respective species of animals. I am inclined to doubt the possibility of tubercle bacilli in the feces being the cause of the infection of cattle and other mammals with tuberculosis. I appreciate greatly the great

work accomplished by Dr. Schroeder, and agree with him that the disease may also be transmitted to hogs by the feces of cattle, but in such cases the cattle are affected with open tuberculosis, and these cases are rare.

Dr. Peters (Nebraska): I have found that in the west tuberculosis in hogs is more frequently contracted from the infection of the fecal matter than through milk. I am unable to state whether it was open tuberculosis or not, but I can give the record of 122 farms visited. These farms were visited for the purpose of learning why tuberculosis existed in our State. The dairymen were resenting the claim that it was caused through milk, and so we found by visiting these premises that more than half of the farmers never fed milk to the hogs at all. I wish to say that probably Prof. Heymans is not acquainted with the method of feeding hogs in this country. A large proportion of the hogs follow the cattle, as our farmers believe that this is the only profitable way of raising hogs. I believe there is a great deal of danger from that source, at least we have found it so after careful examination. What is the farmer to do in all these matters? They are not disinterested. They are ready to meet every reasonable requirement. We should have the farmers' coöperation in this work, and then act with them, somewhat as boards of health make known their requirements, and try to bring them up gradually if they will come along. If we make common-sense requirements, I believe the farmers will gradually coöperate with us and meet every reasonable requirement. Furthermore, if we are to have the very best dairy products that can be produced according to modern requirements, the farmer must receive better pay for his articles. We need to go into the cities and towns and teach the city people the difference between good and bad milk.

Dr. Schroeder: The prevalence of this disease in hogs is very largely due to the mingling of hogs with tuberculous cattle. I do not know any way by which this can be prevented as long as people allow them to follow cattle that are affected with tuberculosis. I duplicated that condition at the experiment station and also exposed animals to a manure pile which contained manure from stables where tuberculous animals had been kept, with the result that all such exposed animals became infected.

With regard to creamery employees, I would state that it is generally the case that this class of men do not drink a large quantity of milk. They see too much milk, and they see how it is prepared.

Concerning the experiments of Drs. Beebe and Reynolds, I would suggest that possibly these investigations were not sufficiently searching. Dr. Rosenberger, of Jefferson Medical College, published a paper on the subject in which he found that tubercle bacilli were quite frequently present in the feces of tubercular patients. There are also numerous cases on record

in medical literature showing that the typhoid germs are frequently distributed by means of the urine.

I have made extensive investigations with reference to the elimination of tubercle bacilli. Our investigations were very careful and painstaking, our material was obtained by centrifugalization, and was examined microscopically and also by inoculation of test animals. Typhoid fever bacilli are carried in quite a different way from that of tubercle bacilli. It is supposed at the present time that typhoid bacilli are excreted through the urine, and that there is a certain amount of infection in the bladder and that the urine serves as a culture-medium for the bacilli.

I agree with Prof. Heymans that we have practically no means of distinguishing between open and closed tuberculosis. So far as the elimination of tubercle bacilli is concerned, I am in perfect accord with Prof. Heymans. Personally, I do not believe that it is a common thing for tubercle bacilli to be eliminated through the healthy organs of animals. But the elimination of tubercle bacilli in the feces makes the environment of tuberculous animals just as dangerous as the tuberculous animals themselves. It seems that we agree perfectly on this subject.

PORCINE TUBERCULOSIS.

By S. Stewart, M.D., D.V.M., and A. T. Kinsley, M.Sc., D.V.S.,
Kansas City, Mo.

Tuberculosis in swine is wide-spread among the herds of the central part of the United States, and the rapid increase in the number of hogs found to be tubercular has stimulated a careful study of the means of spread of the disease. The differences in the gross lesions found in swine and cattle has given rise to the contention that the bacillus of swine tuberculosis is not the same bacillus which produces tuberculosis in cattle. An investigation of the forms and conditions of feeding gives abundant proof that the principal source of swine infection is from tuberculous cattle. In order to make hog-raising most profitable, they are fattened in the same pens with cattle, the hogs eating the feces of the cattle, which contains a large portion of the undigested and partly digested grain. One tubercular cow or steer in a herd of 15 to 30 cattle and twice the number of hogs in a feeding pen will usually result in the infection of all the swine and part of the cattle.

If the pigs are quite young, the disease may run a rapid course and the pigs fail to grow in size and fatness, but instead become emaciated and die. If eight to twelve months old when placed in the feed lot, they have a greater resisting power, and become mature and fat even though tubercular lesions are wide-spread or generalized.

Infection evidently takes place through the mucous membrane of the alimentary tract, and in a large percentage of cases the invasion is through the mucous membrane of the mouth and pharynx, the gross lesions being confined to the related lymphatics, the submaxillary, parotid, or superior cervical glands. The invasion may occur through the intestinal mucous membrane only or simultaneously through both portions of the canal, and through either channel of entrance be carried to any part of the animal.

The gross lesions are characterized by enlargement of lymphatic glands, the formation of tubercles of variable sizes in or upon the serous surfaces and within the substance of gland organs, bones, and connective tissues. The tubercular growths give increased density to invaded soft tissues, which lead to easy detection except in case of recent invasion.

Tubercular nodules present about the same surface color as the membranes on which they develop. On cross-sections the central portion is usually caseous and slightly yellow or fibrous and nearly white, many times presenting a combination of both forms, and may contain minute calcareous particles, but rarely being liquid. The variations are believed to be due to difference in virulence of invading bacilli and tissue involved.

Pathological Histology.—The microscopical appearance of tubercular lesions of hogs has been described by several different investigators. In the examination of porcine tubercular lesions the last few years one constant variation in the structure of the tubercle has been noted. The present investigation was instituted for the purpose of confirming the findings of previous investigators and determining if there were any variations in the structure of the tubercles. The carcasses of 257 hogs were studied at the time of slaughter and notations made upon same. One specimen was obtained from each carcass for microscopical observation, and at least three sections were studied from each specimen, so that the following data are the summary of the conditions observed in 770 microscopical sections. A special card was used in recording the data. One of the cards was used for each carcass from which the samples were taken. The manner of making the notations is illustrated by the following marked card:

PORCINE TUBERCULOSIS.

Kindly answer the following as accurately and concisely as possible:

1. Number. 25.....
2. Male.....
3. Breed. *Poland China*.....
4. Condition of carcass.....good.

		CENTERS			
5. Cervical lymph-nodes.....	involved,	few,			
6. Prepectoral lymph-nodes.....	not involved,	single,	few,	many,	entire organ
7. Lung.....	not involved,	single,	few,	many,	entire organ
8. Bronchial lymph-nodes.....	not involved,	single,	few,	many,	entire organ
9. Mediastinal lymph-nodes.....	not involved,	single,	few,	many,	entire organ
10. Pleura.....	not involved,	single,	few,	many,	entire organ
11. Liver.....	involved,			many,	
12. Hepatic lymph-nodes.....	involved,			many,	
13. Spleen.....	involved,				entire organ
14. Mesenteric lymph-nodes.....	not involved,	single,	few,	many,	entire organ
15. Sublumbar lymph-nodes.....	involved,	single,			
16. Peritoneum.....	not involved,	single,	few,	many,	entire organ
17. Kidney.....	not involved,	single,	few,	many,	entire organ
18. Ovary or testicle.....	not involved,	single,	few,	many,	entire organ

614

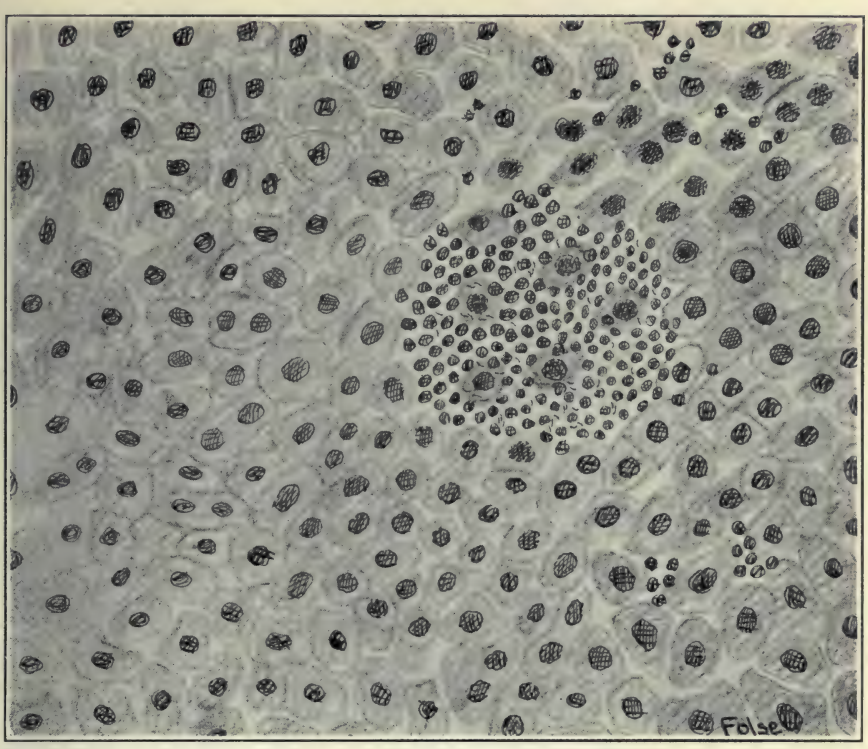


Fig. 1.—Small cellular tubercle; liver. ×500. Showing small round cells with tubercle bacilli scattered here and there, also a few partially destroyed hepatic cells.

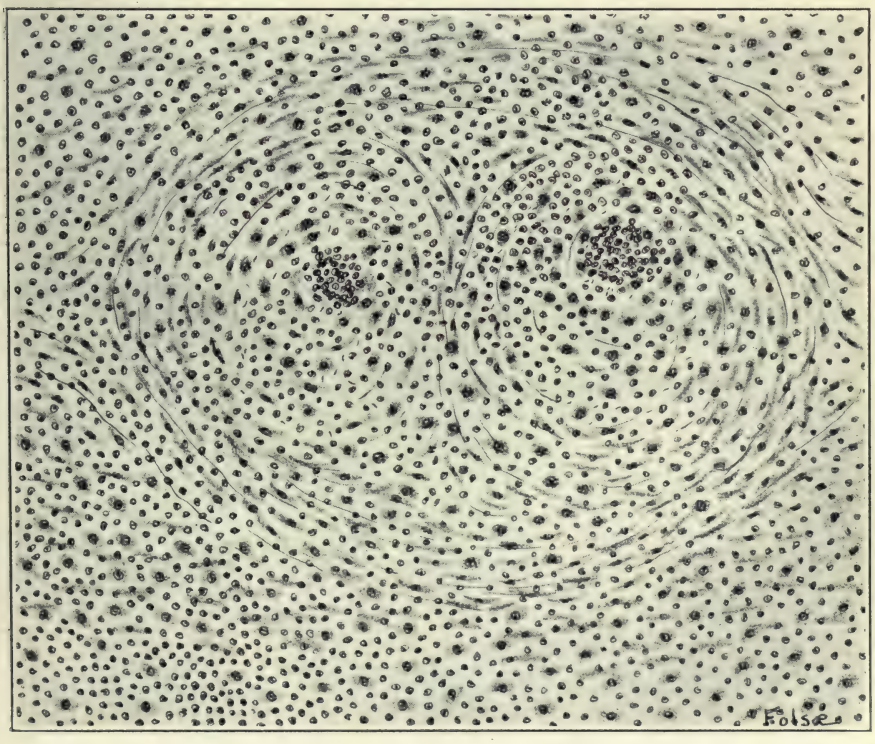


Fig. 2.—A large cellular tubercle; liver. ×250. Showing a central focus of small round cells, more or less disintegrated. Surrounding the central focus there are epithelioid cells, leukocytes, and small round cells. Peripherally there are many fibroblasts beginning to form a capsule.

PORCINE TUBERCULOSIS.—(*Continued.*)

		CENTERS
19.	Uterus or penis	not involved, single, few, many, entire organ
20.	Mammary gland	not involved, single, few, many, entire organ
21.	Bones	not involved, single, few, many, entire organ
22.	Muscular tissue	not involved, single, few, many, entire organ
23.	Skin	not involved, single, few, many, entire organ
24.	Condition of tubercles	calcareous
25.	Sample taken from *liver*	

Sample need not be larger than a small marble.
Obtain an entire tubercle if possible.

NAME.....

The above is interpreted as follows: The notations refer to the twenty-fifth hog, male, Poland China, in fair condition; the cervical lymph-nodes contained a few tubercular centers, the liver contained many centers, etc. The lesions were calcareous, and the specimen for microscopical study was obtained from the liver.

The specimens collected for microscopical study were placed immediately in one-ounce tin boxes and labeled. The samples were placed in a 4 per cent. solution of formalin, at the laboratory, the same day that they were collected, if they were not calcareous. (The tin boxes were washed in a solution of formalin immediately after the removal of the specimen to prevent contamination of future specimens.) Calcareous specimens were decalcified in a dilute solution of nitric acid and then transferred to 4 per cent. solution of formalin. The specimens were usually left in the formalin solution for twelve to eighteen hours, and then sectioned with a freezing microtome; a few specimens were embedded in collodion and sectioned with an automatic precision microtome. The sections were cut from 8 to 14 microns in thickness. For the determination of the histological structure of the tubercle the sections were stained with hematoxylin and eosin or with hematoxylin and picrofuchsin. The following technic proved the most efficient for staining the tubercle bacilli in sections; the sections were fixed on the slides with egg-albumen and then immersed in carbolfuchsin maintained at a temperature of 36° C. for twelve to eighteen hours. The sections were decolorized and counter-stained with Gabbett's methylene-blue, after which they were dehydrated and cleared with xylol.

The lesions from the 257 cases may be grouped into five different classes, according to the condition of the tubercles, as follows:

1. *Cellular centers or tubercles:* These centers varied in size from a few

cells to masses the size of a pea. Structurally, these tubercles were fairly constant, regardless of the tissue in which they occurred, being composed of small round-cells (lymph-cells) in the smaller centers; as the tubercles become larger, epithelioid cells appear in varying numbers. The epithelioid cells were most prevalent in the central zone. The larger centers were usually limited by a peripheral zone of fibroblasts, and in some instances they were circumscribed by a dense fibrous capsule. Blood-vessels were not found in any of the tubercles. Tubercle bacilli were found in all parts of these tubercles. The accompanying illustrations (Cuts 1 and 2) demonstrate the structure of a cellular tubercle. The foregoing description is based upon the evidence obtained from the study of 31 specimens (93 sections) from 31 different hogs. The lesions were obtained from the following tissues:

Tissue	Number of Cases
Cervical lymph-node	7
Lung	3
Bronchial lymph-node	1
Liver	10
Hepatic lymph-node	4
Spleen	2
Mesenteric lymph-node	1
Kidney	2
Skin	1

2. *Necrotic centers or tubercles:* Necrosis-like fibrosis succeeds the cellular lesions in the tubercle. Necrosis in tubercles of tuberculosis is probably the result of the excessive activity of quite virulent tubercle bacilli, or the infection occurs at a time when the animal is depressed and unable to resist the invasion of the microörganisms. By reference to the records it is found that 74 per cent. of the hogs in which there were necrotic centers contained tubercular lesions in three or more different groups of lymph-nodes or organs. Histologically, necrotic tubercles are characterized by a necrotic center which may be surrounded by lymphoid cells intermingled with epithelioid cells, the entire center being surrounded by fibroblasts (Cut 3). The relative proportion of the necrotic area and various cells is dependent upon the age of the lesion. Necrotic tubercles of long standing are practically of a mass of necrotic tissue surrounded by a zone of fibroblast or fibrous connective tissue. The necrotic tissue is invariably caseated, only two tubercles having been observed in which the necrotic tissue was in a fluid state. Tubercle bacilli were found principally in the cellular areas surrounding the necrotic mass, although a few were demonstrated in the periphery of the necrotic tissue. The necrotic tubercles, like the cellular tubercles, were non-vascular. The above lesions were observed in 70 carcasses (210 sections). The specimens were obtained from the following structures:

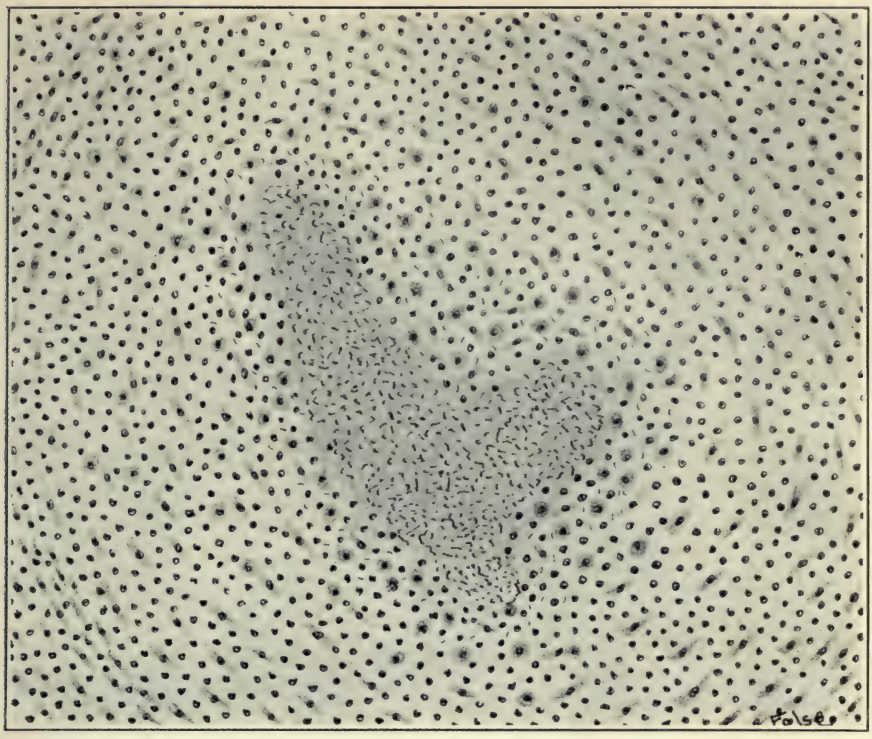


Fig. 3.—A necrotic tubercle; lung. ×250. Showing necrotic center surrounded by small round cells, epithelioid cells, and leukocytes. Many fibroblasts are evident peripherally. Tubercle bacilli evident around the margins of the necrotic center.

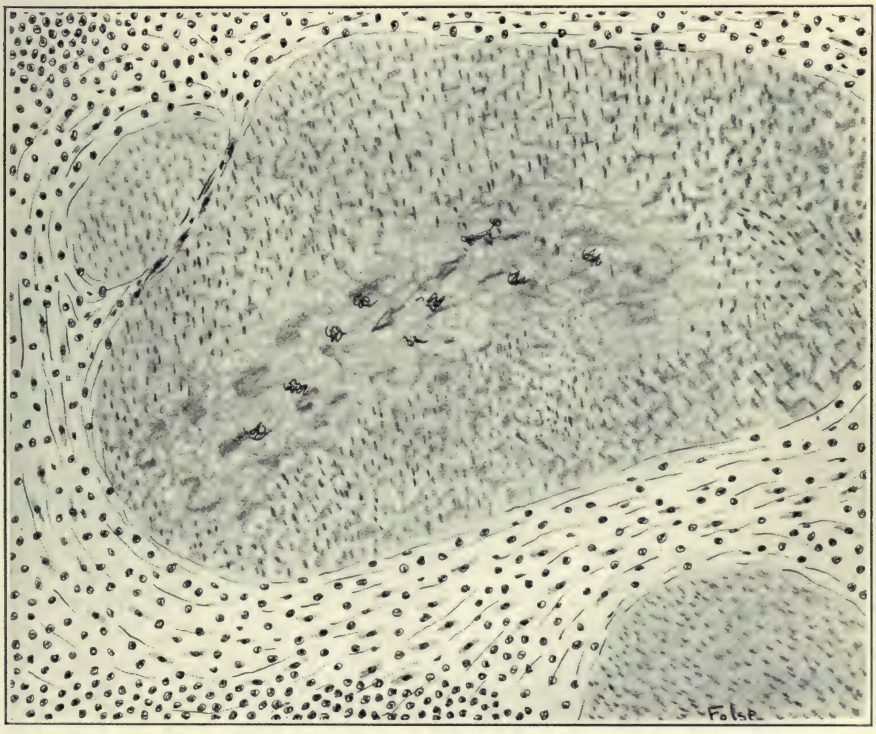


Fig. 4.—A calcified necrotic tubercle; cervical lymp-node. ×250. Showing calcareous areas in central portion of necrotic mass. The entire tubercle distinctly encapsulated.

Tissue	Number of Cases
Cervical lymph-node	15
Prepectoral lymph-node	1
Mesenteric lymph-node	6
Liver	1
Hepatic lymph-node	10
Lung	9
Spleen	6
Bronchial lymph-node	19
Pleura	6
Superficial inguinal lymph-node	1

3. *Calcified necrotic centers or tubercles:* These centers were identical with the lesions described in the previous paragraph, except they were of longer standing and contained calcareous deposits in the necrotic tissue; the cellular elements were inconstant, and there was usually a well-marked fibrous capsule (Cuts 4 and 5). The bacilli were found principally in the periphery of the tubercle. No vessels were observed. The above description is the summary of the study of 110 carcasses (330 sections). The specimens were obtained from the following tissues:

Tissue	Number of Cases
Cervical lymph-node	29
Prepectoral lymph-node	2
Lung	8
Bronchial lymph-node	20
Mediastinal lymph-node	2
Pleura	3
Liver	3
Hepatic lymph-node	13
Spleen	5
Mesenteric lymph-node	10
Sublumbar lymph-node	6
Bone	2
Precrural lymph-node	2
Popliteal lymph-node	1
Superficial inguinal lymph-node	4

4. *Fibrous centers or tubercles:* These lesions varied from the cellular tubercle described above to dense centers of fibrous connective tissue. They are probably the result of infection with slightly virulent tubercle bacilli, which produce a low-grade inflammation accompanied by fibrous hyperplasia. Structurally, the fibrous tubercles may consist of fibroblasts (see Cut 6) or dense fibrous connective tissue almost exclusively; a few other cellular elements, as lymphocytes and epithelioid cells, may occur in the center of the lesion. Tubercle bacilli were demonstrated in 30 per cent. of the fibrous tubercles. The description of this lesion is based upon evidence obtained in the study of 10 cases (30 sections) in which the following tissues were involved:

Tissue	Number of Cases
Cervical lymph-node	5
Lung	1
Mediastinal lymph-node	1
Spleen	2
Superficial inguinal lymph-node	1

5. *Calcified fibrous centers or tubercles:* These lesions were a later stage of the fibrous tubercles. Calcified foci were found in the central portion of the fibrous centers. Structurally, they were identical with the fibrous lesion, excepting the central calcareous foci. Only a very small percentage of these tubercles contained demonstrable tubercle bacilli. There was an occasional small blood-vessel in the periphery of the tubercles. Twenty-five carcasses (75 sections) were studied of this type of the tubercle. The specimens were obtained from the following tissues:

Tissue	Number of Cases
Cervical lymph-node	5
Prepectoral lymph-node	1
Lung	1
Bronchial lymph-node	4
Pleura	1
Liver	1
Hepatic lymph-node	2
Spleen	1
Mesenteric lymph-node	6
Sublumbar lymph-node	2
Superficial inguinal lymph-node	1

In summarizing, the lesions of porcine tuberculosis are two general types. One type is represented by the cellular necrotic and calcified necrotic tubercles. This group of lesions is probably the result of the activity of quite virulent tubercle bacilli. The second type of lesions are those described as fibrous tubercles, which may be preceded by cellular tubercles and usually contain calcareous foci in the later stages; these lesions are no doubt the result of infection with slightly virulent tubercle bacilli.

In the examination of over 770 sections, no giant-cells were observed. This may be explained by some as lack of careful observation; however, even the most careless observer would have certainly observed a few giant-cells if they are as prevalent as some investigators have indicated. The hogs from which the specimens were obtained were from Missouri, Kansas, Nebraska, and Oklahoma almost entirely; a few only were from Iowa, Wisconsin, and Illinois. Giant-cells are probably an indication of extremely virulent tubercle bacilli in bovine tuberculosis. Reaction of the tissue varies in different species of animals, and probably the reaction in the hog to tubercular infection does not stimulate the production of giant-cells.

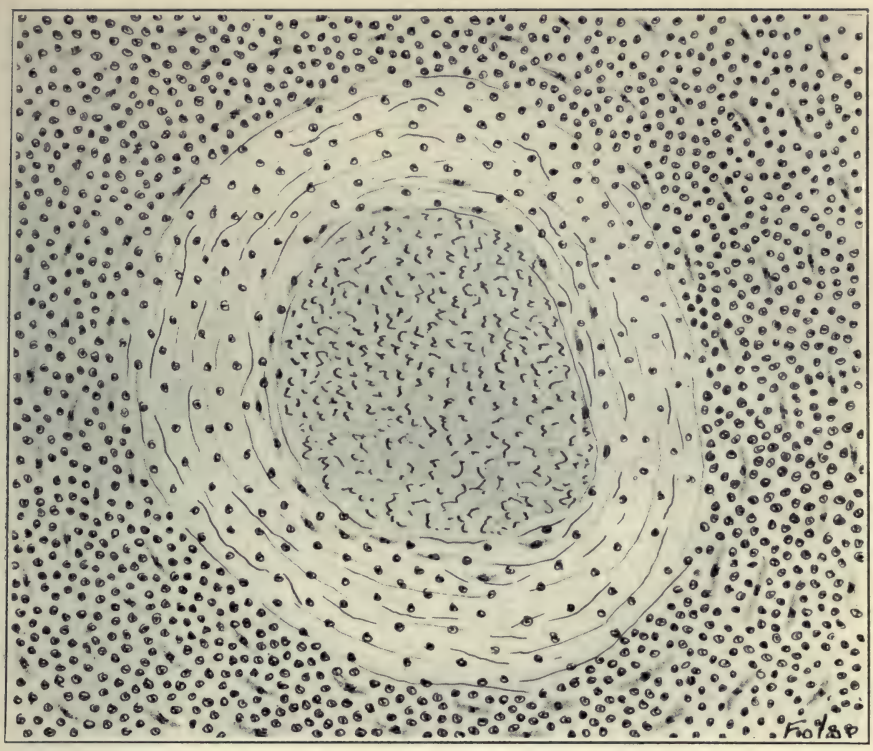


Fig. 5.—A small encapsulated tubercle; spleen. ×250. Showing capsule and necrotic center becoming calcified.

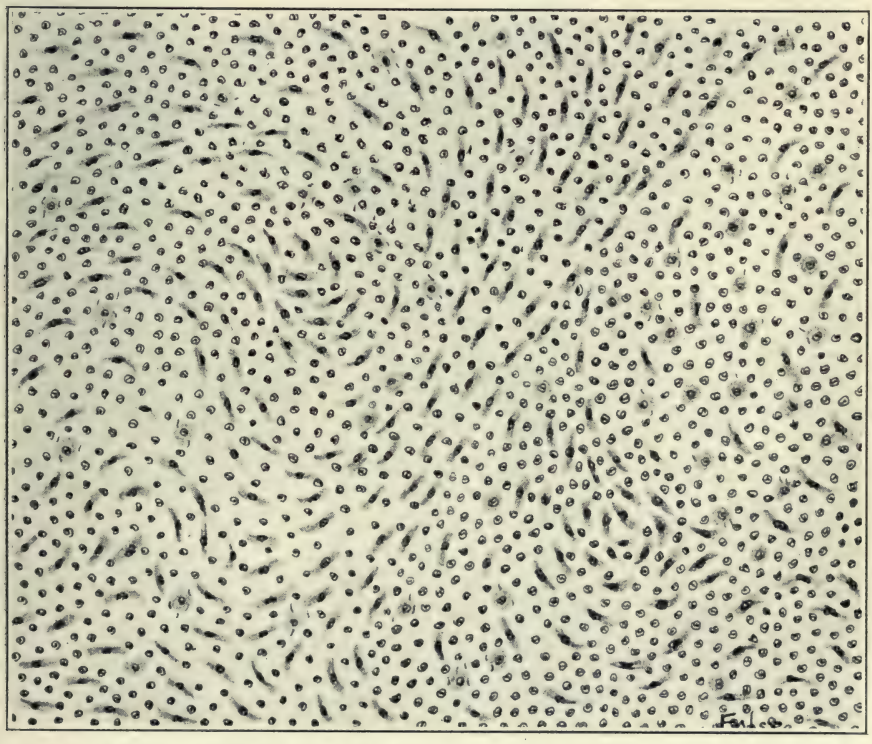


Fig. 6.—A fibrous tubercle; cervical lymph-node. ×250. Showing preponderance of fibroblasts over other types of cells and a very few tubercle bacilli.

In one section a peculiar lobulated cell was observed, and it is possible that another type of cell substitutes the giant-cell in porcine tuberculosis.

Again, it is possible that the hogs from the location described above were infected with tubercle bacilli of diminished virulence, and this is possibly the explanation of the absence of giant-cells.

The above findings confirm the fact that tubercular lesions are non-vascular; that the majority of tubercles undergo central necrosis, but that tubercles may become fibrous without necrosis, and that necrotic porcine tubercular lesions are prone to calcification.

Acknowledgment must be made to the Bureau of Animal Industry inspectors of Kansas City for assistance in the collection of specimens and data of cases, also to Mr. C. D. Folse, who ably assisted in the preparation of microscopical sections and the illustrations.

REVIEW OF RECENT INVESTIGATIONS ON TUBERCULOSIS CONDUCTED BY THE UNITED STATES BUREAU OF ANIMAL INDUSTRY.

By John R. Mohler, V.M.D.,
Chief of Pathological Division, B. A. I.,
AND
Henry J. Washburn, D.V.S.,
Assistant Chief of Pathological Division, B. A. I.

Introductory Remarks.

The past decade has witnessed an unusual animation among experimenters and scientists, who have been making every effort to gain a more complete knowledge of tuberculosis in all of its many phases, and as a consequence countless experiments have been instituted in each of the civilized countries in the hope of gaining a comprehensive knowledge of the character of the tubercle bacillus and a satisfactory means of combating it. Among the many who have persistently advanced in this work may be mentioned the United States Bureau of Animal Industry, and as much valuable study along various lines of animal tuberculosis has been accomplished, it was thought that a brief classified review of some of these investigations might be of interest to the members of this Congress and should be placed on record. That the Bureau is well informed on the extent of tuberculous infection of our food-producing animals is shown by the reports of its inspectors at the various packing centers, and of its agents, who are thoroughly conversant with conditions in the dairies and creameries of each of the States. It is therefore in a position to appreciate the damage which this disease causes, and to make a study of restrictive methods in their application to tuberculous patients, whether found in the human family or among the quadrupeds and birds of our farms and parks.

The Bureau has long recognized the menace which tuberculosis offers to human life and the losses which it brings to our stock-raising and dairying interests, as well as to public exhibitions of wild and rare animals and birds.

In proof of this one has only to glance over its annual reports or to notice the frequency with which the names of its members appear on index cards upon the subject of tuberculosis in the leading libraries of the world. In these investigations many animals have been studied—both those that have become tuberculous by natural infection and others that have been made tuberculous through artificial inoculation. In its laboratories cultures of tubercle bacilli are constantly growing which have been obtained from widely varied sources, and its pathological museum contains an interesting display of tuberculous lesions. At its experiment station a section including stables and yards may be seen which is entirely devoted to the keeping of tuberculous animals during the progress of experiments of immunization, infection, diagnosis, and other important questions relating to tuberculosis.

It will therefore be seen that the Bureau is well equipped for the purpose of studying tuberculosis exhaustively, and the results obtained prove the efficient use to which these equipments have been put.

In the twelfth and thirteenth annual reports of this Bureau, issued in 1895–1896,[3]* attention was first called to the fact that marked differences existed between certain cultures of mammalian tubercle bacilli. It was there shown that some cultures consisted of delicate, slender, curved individuals which possessed only a comparative degree of virulence, while others consisted mainly of short, straight members whose virulence was extreme. This was the publication which gave Koch the impetus for the work which preceded his famous address in London in 1901, and the interest thus aroused has since led to world-wide study of the questions related to tuberculosis.

Although the Bureau readily recognized the fact that differing degrees of virulence were to be found in various cultures, it could not accept Koch's theories without further study, and the biochemic division, the pathological division, and the experiment station forces were at once given instructions to take up the further investigation of this subject. It was found that the separation of tubercle bacilli into two classes, calling one "bovine" and crediting it with excessive virulence for all mammals except man; and calling the other "human," at the same time denying it the degree of virulence granted to the bovine class, and allowing it no possible part in the infection of cattle, was a measure which was not justified by actual careful experiment.

Great differences were found to exist between cultures of known bovine origin. Others identical with the bovine type in every particular were recovered from human subjects. The results obtained led to the conclusion that there existed no essential difference between tubercle bacilli derived from bovine sources and those sometimes derived from man; that there were no characters possessed by bovine tubercle bacilli which might not be possessed by tubercle bacilli of human origin; that tubercle bacilli of widely

* These numbers refer to bibliography at the end of the paper.

different virulence may be encountered in different cases of bovine as well as of human tuberculosis; that the more the subject is studied, the more numerous are the instances noted in which bacilli appear naturally in animals that are far removed from the species supposed to be their natural host, thus proving that they are not closely limited in their choice of victims and that there is no character possessed by any of these types of tubercle bacilli in one host that may not be found in another host under favoring conditions.[30]

It has been furthermore determined that the so-called typical characteristics are by no means absolute, but that under certain conditions and in certain instances they may be modified until they will assume the morphology, virulence, and cultural characteristics which are supposed to be normal to them only under very different circumstances.

This phase of the subject has been emphatically brought to our notice by close study of the characteristics of tubercle bacilli that have been recovered from tuberculous animals of various species that have died at the National Zoölogical Park. Thus on examination of two monkeys it was found that the lesions in one were due to tubercle bacilli possessing the characteristics of the bovine type, while the other one was affected, as monkeys usually are, with tubercle bacilli of the human type.

The subject of transmission of tuberculosis from tuberculous animals to man or to healthy birds or animals has received careful attention. In making investigations along this line much painstaking work has been done in making bacteriological examinations of milk, butter, cheese, creamery sediments, etc., from widely varied sources, also of dust and hay from stock stables, and of feces, urine, and saliva from tuberculous cattle. The results obtained by this line of investigation have served to point out some of the ways in which the tubercle bacillus is commonly preserved, and later transferred to some susceptible subject. This will be taken up in detail later.

The question of the possibility of the establishment of tubercular lesions in the lungs from tubercle bacilli taken into the system with the food has been carefully worked out and decided in the affirmative.[28]

Tests of the chemical reactions developed in fluid culture during the growth of tubercle bacilli have been made, it having been suggested that much could be determined by this means as to the real character of the culture. This test has not been found reliable by the bureau, as cultures known to be of bovine origin have given the acid reaction, which should only accompany cultures of human or avian origin, and a number of flasks simultaneously and similarly prepared and inoculated have been found to give differing reactions.

Much attention has also been given to comparative tests of culture-media of various kinds, and the superiority of certain media for particular lines of tubercle bacilli cultivation has been accurately determined.

The difficulty which is usually experienced in growing cultures of tubercle bacilli directly from animal tissues led the biochemic division to undertake experiments for the purpose of finding some material, readily obtainable, which would permit and encourage the growth of tubercle bacilli directly from pieces of some affected organ. The result was a preparation of eggs and glycerin, which has been found, after extensive use, to meet the requirements excellently.[16]

The addition of acid potassium phosphate to beef bouillon instead of sodium chlorid was also found to produce a more rapid and characteristic growth of cultures after they had been once recovered from tuberculous lesions.[4, 23]

The composition of tubercle bacilli when grown upon various media has been studied with reference to their mineral constituents as well as fats and volatile and non-volatile acids, and a wide variation in the chemical composition found, but no definite conclusions were drawn between the constant chemical differences of the several varieties of tubercle bacilli.[10, 11, 12, 22]

Owing to the high content of fat found in tubercle bacilli, the use of Sudan III as a staining agent suggested itself, and its use for this purpose has given satisfactory results.[14]

Considerable effort has been expended by bureau representatives in an attempt to prepare sera and attenuated cultures for the cure of tuberculosis in cattle, but thus far without success.[5,9,13] This work was taken up in connection with the preparation of tuberculin.

Immunization investigations have not been neglected. The methods devised by von Behring, Koch, and Pearson have been tried, and others offering more or less originality have been tested in comparison with these.

The result which it is most ardently desired may be derived from these laborious studies, so far as practical agricultural interests are concerned, is to have tuberculosis eradicated from our homes and farms. Attention has therefore been given to methods of disinfection, to the resistance of tubercle bacilli to various disinfectants, also to the effects of light and heat upon them and to their capacity for maintaining life while in milk, butter, and other substances.[36] The supervision of packing plants, markets, etc., from a sanitary standpoint has been carried out as an added means of eradicating sources of tubercular infection. The danger of tuberculous foods, particularly meat and milk, to the public health, has been fully realized and vigorous measures taken to prevent their distribution to unsuspecting consumers.

Having briefly outlined the various lines along which investigations into the absorbing subject of tuberculosis have been carried by the Bureau of Animal Industry, the work will be taken up in review, with closer attention to detail, although the magnitude of the subject and the number of interests involved will constantly call for condensation.

Prevalence.

Infection of cattle and hogs is most frequently seen in districts in which dairy interests are prominent, but the arid southwestern plains, and even the Pacific mountain regions, are not totally free.[29]

The records for the condemnations for tuberculosis by inspectors of the Bureau of Animal Industry, during the years 1900 to 1907 inclusive, show the following increase in percentage of the animals slaughtered under inspection.

	Cattle.	Hogs.
1900	0.089	0.0186
1901	0.10	0.035
1902	0.14	0.059
1903	0.14	0.092
1904	0.16	0.143
1905	0.18	0.256
1906	0.196	0.357
1907	0.253	0.206

The losses from tuberculosis to the farmers of this country can hardly be appreciated or calculated. There are at present approximately 19,000 carcasses of beef and 66,000 carcasses of hogs condemned annually by the inspectors of the Bureau. State dairy inspectors condemn numerous dairy cows for tuberculosis in addition to these, and many others are slaughtered at small private slaughter-houses where no record of numbers or values is kept.

The losses of small pigs on some farms, due to tuberculosis contracted from brood sows with tuberculous mammæ, or from being fed with milk containing tubercle bacilli, should not be overlooked. Breeders of pure-bred cattle are also forced to bear heavy burdens through losses of valuable breeding animals and through the disturbance of their trade with would-be purchasers living at a distance. In this connection it may be stated that the breeder of pure-bred stock who is in a position to warrant his stock as free from tuberculosis will find such a guarantee to be a valuable recommendation for his herd, and satisfactory sales will no doubt result, which could not be made from a herd in which tuberculosis was suspected.

The recent awakening of interest in the matter of obtaining pure milk-supplies for our various cities and towns has led to the application of the tuberculin test to many dairy herds. The percentage of tuberculosis detected in these cases by the use of bureau tuberculin varies from 2.79 to 19.69 in the several States. It can readily be seen, however, that these figures do not give any real indication of the prevalence of tuberculosis among our cattle, as in all probability the majority of these tests were made in herds in which the disease had already been suspected, and consequently the percentage given above is much greater than would be shown if all of the cattle of each

State were subjected to the test. An average of these extremes, or 11 per cent., would probably be more indicative of the actual extent of tuberculosis in our dairy herds.

The increasing frequency with which tuberculosis is being discovered among flocks of fowls and pigeons calls attention to another source of considerable loss through this disease. These centers of avian tubercular infection are widely separated, having been found on the Pacific coast, along the Hudson River, and at a few intermediate points.

In all of the flocks attacked and examined it has been noted that the spread of the disease among the birds has been very rapid, and so virulent has the infection in these cases proved, that only few of the individuals in the flock escape after the infection has become established. The disease is spread readily from bird to bird by way of the digestive tract, and from the well-known habit of fowls in picking their food out of dirt, and even from manure piles, it is evident the infection will be quickly taken up by the healthy members of the flock.

An interesting case is reported by one of the bureau inspectors in Oregon, who has found a ranch from which most of the fowls, and all of the turkeys, have been lost through deaths from tuberculosis, and whose swine, on reaching the abattoir for slaughter, have been found badly tuberculous. Investigations are now in progress whose purpose is the tracing, if possible, of the infection of the hogs to the eating of tuberculous fowls, or the infection of the fowls to the ingestion of tuberculous hogs, or, what would prove to be more valuable still, to trace the infection of both birds and hogs to some common source, as yet unknown. It is of interest to note that three daughters of the proprietor of this ranch have died of tuberculosis and that a son is now in the last stages of the disease.

Character and Relationship of Tubercle Bacilli.

The greatest interest attaches to the character and relationship of tubercle bacilli as found in their several hosts. This relationship between the tubercle bacilli recovered from the various species of mammals, birds, fishes, and reptiles is certainly very intimate. It may be that the slight differences which may now be demonstrated between the different types of tubercle bacilli have been of slow development, and due to their environment, to differences in the temperatures at which they have been forced to live, and to differences in the amount and quality of the nutrition with which they have been supplied.[15] Whatever the variations between the types, they are not great enough to prevent the successful interchange of tubercle bacilli by means of inoculations between representative hosts of the several types.

Recognizing the countless variations that occur in tubercle bacilli under natural conditions, the question must arise, What are the conditions that

cause some of these individuals to develop as short, plump, virulent bacilli, while others have been forced to assume long, curved, and beaded forms and to relinquish much of the virulence possessed by shorter members? It is very generally admitted that continuous artificial cultivation leads to the attenuation of these organisms. While this phase of the subject has been noted by the bureau workers, the attendant increase of adaptability to artificial conditions has not been ignored, and the causes of increased virulence, of peculiar affinities for certain species of animals, and the unaccountable appearance of certain types of tubercle bacilli in races of animals which are supposed to possess great immunity to them have also been borne in mind.

Of interest in this connection is an inspection of cultures of tubercle bacilli that have been grown in the pathological laboratory for several years either in liquid or on solid media, and that have during this period completely lost their resemblance to the type which they represented so perfectly a few years previously. Primary cultures gave no signs of growth upon culture-media until fifty-three days after inoculation. During the first month of its cultivation it was capable of causing generalized tuberculosis in guinea-pigs in from thirty-one to seventy-six days. During this period it required solid media for its propagation. Now, after fourteen years of laboratory cultivation, it will show manifest growth within thirty-six hours after planting, whether placed upon solid agar or upon glycerin-bouillon media. The mass of material which finally results from its continued growth has the appearance of a strip of thin, whitish, dry felting. The pathogenic properties of this culture have disappeared during the course of its transformation until, at the present time, the injection of guinea-pigs and rabbits with large doses will produce no visible results.

The alteration which is most noticeable in cultures of tubercle bacilli after passage through animals is either an accentuation or attenuation of virulence, with altered morphology also in evidence. Change of virulence in these cases seems to be dependent largely upon the natural susceptibility to tuberculosis of the animals injected and upon the number of tubercle bacilli used at each injection.

There is, of course, no way of determining the effect which growth within the human system would have upon bovine tubercle bacilli. So far as most investigations have been reported, there has seemed to be but slight modification evidenced in the characters of those cultures which have been assumed to be of bovine origin at the time of the isolation of the cultures, but as the usual means of judging of the type of such cultures was simply by consideration of their form, virulence, and cultural characteristics, there is no assurance that many of the other human cultures studied were not of bovine origin, but, owing to continued growth in the human system, had been

obliged to exchange their more prominent bovine characteristics for those of the human type.

The growing of tubercle bacilli upon human blood under artificial conditions should impart to the organisms some of the changed characters which growth for a similar period of time within the human body would produce; and with a view to watching the effect of such culture, human blood has been obtained in sterile test-tubes, distributed in suitable quantities, then sterilized by the fractional method, and later inoculated with cultures of bovine tubercle bacilli. The result of growth upon this human blood was that material lengthening occurred, and that beading became very general after three months' retention upon this unusual medium. The growth, however, was continued for one hundred days and more, and by this means the fact was apparently established that the introduction of bovine tubercle bacilli into conditions which must be identical, so far as chemical constituents are concerned, with those found in the human body, will not destroy them, but, on the contrary, will permit of their continued growth.

Bovine tubercle bacilli that have been grown for a like period of time upon dog serum do not show such change of form, but remain for a longer period of time short, straight, and without beading. It is probable, therefore, that the bacilli here described have assumed a more saprophytic character, and are capable of more rapid accommodation to various cultural exigencies than they were at first. In their general appearance they must now be regarded as closely allied to the type of tubercle bacilli derived from deer and cats. Owing to the limited supply of suitable human blood for the continuation of this test, the work could not be extended over as long a period of time as would otherwise have been thought desirable.

A similar lengthening of the bovine bacillus, together with an increased growth, has also been observed along the edge of a streak of paraffin on the surface of egg, serum, or agar.[24]

Viability of Tubercle Bacilli.

The length of time that tubercle bacilli will continue to live and retain their virulence while in butter and other dairy products under usual market conditions has been made a subject of extended investigation.[8, 20]

In these tests butter has been made from milk that has been infected by the addition of bovine tubercle bacilli from cultures, milk soiled with feces from a tuberculous cow, and another lot has been made from milk obtained from a cow with a tuberculous udder from which tubercle bacilli were being excreted daily in great numbers. These samples of butter have been prepared in both salted and unsalted condition, and have been tested upon guinea-pigs both by feeding and inoculation tests immediately after its manu-

facture, again after keeping in cold storage for a period of ten days, and again at intervals of thirty and ninety days; and finally after six months' retention in a cold-storage plant. All of the samples that had been kept for thirty or ninety days were capable of producing fatal disease in guinea-pigs, while the unsalted sample after storage for practically six months caused slight tuberculous lesions to develop in the liver and spleen of one of the six guinea-pigs inoculated. As the butter which was made under exactly the same conditions, but to which 4 per cent. of salt was added at time of manufacture, failed to perpetuate the tubercle bacilli as long as the unsalted sample, it seems evident that the salt must have exerted some destructive influence upon the bacteria, thus causing them to disappear from the butter earlier than they did where no salt was present.[38]

The testing of feces, urine, and milk from cows known to be tuberculous has shown that many of these animals, even though presenting no external evidences of disease, constantly distribute tubercle bacilli by means of their fecal excrements. The number of cows shedding tubercle bacilli in this manner no doubt is far in excess of those producing tuberculous milk from tubercular udder lesions, and one of the greatest dangers of infection of man from tuberculous cattle may be found in this particular means of infecting milk through soiling it with feces bearing tubercle bacilli.[39]

Tubercle bacilli given to cows in their drinking-water were found to pass through their digestive tracts and appear in their excrement without having lost their power for producing tuberculous disease. This indicates that cattle with tuberculous lungs, while they do not expectorate, still scatter tubercle bacilli freely by coughing them up and then swallowing them, allowing them to mix with the ingesta.[32]

Through endeavors to trace tubercular infection of the hogs of certain localities to its source suspicion has been cast upon the skimmed milk or separator milk from public creameries, and separator sediment has been obtained from a number of such establishments and tested for the presence of tubercle bacilli. This material has been investigated by means of animal inoculations and microscopical examination, and these have demonstrated the presence of tubercle bacilli in about 25 per cent. of the samples, which shows the necessity of protecting calves and pigs from this source of infection. Through the practice of mixing all of the milk from several farms as it is separated and before the skimmed milk is distributed among the farmers to be taken back to the farm for feeding to young stock, the product of a single tuberculous herd may contaminate the entire product of the vat into which it is placed, and the infection of tuberculosis may be carried to several farms which have always up to this time been free from this disease. For this reason it behooves hog-raisers to see that their skimmed milk has been properly sterilized before they feed it, and the State authorities to make such

heating by creameries compulsory as a simple and easy way of greatly reducing swine tuberculosis.

It having been suggested that the acid-fast bacilli found in hay and about the stables may bear some relation to the tubercle bacilli found affecting animals, a number of tests have been made by injecting some of the acid-fast hay bacilli into animals. The lesions thus produced resemble closely those developed following the injection of tubercle bacilli that have been sterilized. The several foci are small and are not inclined to grow or spread. Neither do they show the amount of inflammation which is caused by virulent tubercle bacilli. From the work done in this line it has been made evident that tuberculosis of hogs and cattle is always dependent upon tubercle bacilli for its origin, and cannot be developed from the bacilli which are found in the dust of hay barns or stable floors, but must arise from a preëxisting case of the disease, whether in man or animal.

It is well known that sunlight is an efficient agent in the destruction of tubercle bacilli. Experiments have shown that tubercle bacilli when exposed in thin layers to direct sunlight will be killed in comparatively a few minutes. Tubercle bacilli in sputum or in pus from tubercular abscesses when treated in this manner will lose their vitality within two hours. This fact should be borne in mind by those who are attempting to clear any farm or stable premises of tuberculosis. Were it not for this efficiency of sunlight in destroying tubercle bacilli, one of the hardest tasks connected with the eradication of tuberculosis from the farm would be the sterilization of the infection upon the surfaces of the yards and pastures. Wherever tuberculous cattle or swine have been yarded, the spreading of great numbers of tubercle bacilli must follow. The same beneficial actions are exerted upon the infectious sputa which are scattered about the streets by careless consumptives. Reasoning from these results, no one should fear to let the sunlight into dwellings or locations inhabited by those who are affected with tuberculosis, not alone for the good of the patient, but also for the added safety of those who live with him.

Many tests have also been made for the establishment of the minimum degree of heat which will be required to destroy tubercle bacilli in fluids with a view to the application of this knowledge to the pasteurization of milk. The boiling of milk affects its digestibility, making it less suited to some stomachs and positively harmful to some children. It has been found that the tubercle bacillus has no great powers of resistance against heat, 60° C. proving quickly destructive to it. This temperature does not alter the character of the milk, and will in twenty minutes destroy all of the tubercle bacilli that may be contained in it. One-half of this exposure will in most instances prove sufficient, but there is always a chance that the utensils containing the milk and the milk itself will be cold when the pasteurization is begun,

and will thereby lower the temperature of the heating apparatus so much when placed in it that a careless operator will not thoroughly cleanse the milk from virulent organisms. Therefore twenty minutes should be insisted upon. Tuberculous meat products are carefully excluded from the trade by inspectors of the bureau, hence the danger which might accrue to the public from their consumption is obviated by the purchase of inspected meats only.

Modes of Infection.

In 1903, in one of the bureau's experiments, 7 healthy cattle and 3 tubercular cows were confined in a stable containing 10 box stalls.[21] Five of the healthy cattle and the three tubercular cows occupied different stalls each day in a rotation which exposed each of the healthy cattle equally to the 3 tubercular cows. Two of the healthy cattle occupied stalls near the center of the stable and were at no time allowed to enter other stalls or to come into closer contact with any of the other cattle.

These conditions of exposure were maintained for six months, and during this period 6 of the 7 healthy cattle contracted the disease to which they had been exposed—a fact which was fully proved by autopsies. The importance of this observation lies in the fact that it points out clearly that cattle cannot be protected from tuberculosis in stables with tuberculous cattle present, simply by the careful restriction of each animal to its own individual stall.

The tendency of the results obtained from these experiments is to point to the conclusion that the presence of tubercular cows in a dairy herd is a danger which affects not only the health of the persons who use the milk, but also the prosperity of the owner of the cattle, and consequently that it is necessary that our dairy herds should be made free from tuberculosis as soon as possible. Not only is the milk produced by tuberculous cattle capable of becoming infected with tubercle bacilli excreted from the mammary gland, as has been definitely established by several bureau investigators,[1, 2, 25] but it is also likely to become polluted with tubercle bacilli from external sources. These experiments seemed to demonstrate the fact that tubercle bacilli are apparently more numerous in the environment of tuberculous cattle than in their secretions from organs, like the udder, which have not become involved in the disease. Irrespective of the view that may be taken relative to the elimination of tubercle bacilli from the bodies of tubercular animals in their secretions from unaffected organs, it must be admitted that the chance for the introduction into these secretions, or into the secretions of healthy animals in the same environment, of infected material, such as particles of soiled forage or bedding, dust, masses of mucus which have adhered to the skin, hair, etc., is a very great danger, decidedly of too much importance to be ignored.[34] The habit which cattle have of licking each other is sufficient to account for the occurrence of tubercle bacilli in the milk of a

healthy cow into which some of her hair or scales of epidermis have fallen after she has been in contact with a cow affected with tuberculosis of the respiratory organs, while of still greater importance must be considered the possible contamination of such milk by particles of infected manure, in the form of dust, dirt, etc.

An interesting feature of one of the stable infection investigations was the fact that the cow which proved to be the most active disseminator of tubercle bacilli was not one that exhibited clinical symptoms of tuberculosis, but, on the contrary, was fat, in excellent condition, and apparently in perfect health. She was the fattest and smoothest appearing individual in a dairy herd of 20 cows, and at the conclusion of the test she was in prime beef condition.

Cattle of this kind show that it is impossible to eradicate tuberculosis from a herd without the use of tuberculin. The degree of danger offered by this type of cattle is shown by the fact that 2 of the 4 guinea-pigs which received room exposure in the stall of the cow in question became affected with tuberculosis, while none of the other guinea-pigs subjected to similar exposure with other cows of the test contracted any tubercular lesions, notwithstanding the fact that many of the other cows were weak, emaciated, affected with a cough, and were displaying other evidences of the disease.

The chief method by which the tubercle bacillus enters and obtains lodgment in the animal body is not absolutely known, however, and to-day there are two principal ideas on this subject, both of which have many adherents among leading scientists. One opinion which has been adhered to for years is that the principal mode of infection in tuberculosis is by the inhalation of bacilli-laden air, thus permitting the almost direct lodgment of tubercle bacilli within the lungs, with subsequent development of pulmonary lesions, which are generally the most pronounced alterations present. The opposite view, while admitting that pulmonary tuberculosis is by far the most common form of the disease, holds that the lungs become diseased indirectly as a result of the tubercle bacilli entering the system by the mouth (ingestion), after which they are swallowed, taken up by the intestinal lacteals without any injury to the intestinal mucous membrane, pass into the thoracic duct, thence into the venous circulation, and finally are filtered out of the blood by the lungs. That this latter opinion is correct in a great number of instances is supported by numerous careful experiments of the bureau, and is probably the chief method of infection, especially in animal tuberculosis. That other modes of entrance for the tubercle bacilli are present in addition to their entry through the digestive and respiratory tracts is evident by a study of such localized lesions as tuberculous genitals of a bull, or a local tuberculous arthritis of the hock joint, indicating respectively infection by way of the genital tract and by direct inoculation through the skin. Heredi-

tary transmission, or congenital tuberculosis in the offspring, is evidently more frequent in cattle than in man; nevertheless it must not be regarded as an important cause of the genesis of tuberculosis, but rather the exposure to infection during post-fetal life. Predisposing causes which arise from unsanitary conditions, lowered vitality, exposure, and forced development, etc., are only responsible for giving the true cause (bacillus tuberculosis) an opportunity for lodgment and development, or better facilities for propagation in case the lesions are already present.

Relation to Public Health.

The latest researches into the question of intertransmissibility of tubercle bacilli from various sources have shown that Koch's doctrine, enunciated in 1901, is not warranted.[17] Variations do occur among tubercle bacilli, as among other forms of bacteria, but they are not constant. It is well known that Koch demanded, as a criterion of the animal origin of tuberculosis observed in man, the proof that cattle when injected with human tubercle bacilli will contract tuberculosis. Decisive proofs of such infection have now been obtained not only by the German Commission on Tuberculosis which was appointed at Koch's request, but also by the Royal English Commission, besides numerous French, Dutch, English, Scandinavian, Austrian, and American investigators.[26, 33] In fact, there have been so many instances on record of bovine tubercle bacilli having been recovered from human tissues, and of instances of butchers and others receiving accidental infections of the skin directly from bovine lesions, that it appears entirely proved that man is susceptible to tuberculosis caused by bovine bacilli. While the presence of bovine tubercle bacilli in human beings is seen to be not infrequent, no definite conclusions can at present be drawn as to the extent of such infection, owing to the lack of data on the subject. But the fact that tubercle bacilli of one species may be transmitted to an animal of a different species or to man makes it apparent that any preventive methods for controlling tuberculosis, to be successful, must take into consideration all species of animals which are susceptible to tuberculosis.

Having ascertained the danger to man which tuberculous milk offers, it becomes necessary to determine if tuberculous meat contains the infectious agent, and if it can produce the disease in animals fed or injected with it. Through numerous experiments much information has been gained to the effect that meat of animals affected with generalized tuberculosis may contain virulent tubercle bacilli. In one series of tests experiment animals were fed with meats from cattle that were only affected with localized lesions of tuberculosis, and whose carcasses had been passed for food. In this series no tubercular infection could be obtained, but when the flesh from condemned cases of generalized tuberculosis was fed, numerous infections of the test

animals followed.[35] It is therefore apparent that harm may follow the ingestion of such meats by members of the human family, and for this reason it is desirable to have all products coming from animals affected with tuberculosis, as well as the slaughter and disposal of such animals, placed under the supervision of an experienced inspector, since the flesh of all tuberculous animals is not equally dangerous, and consequently there must be rational discrimination between the meat of slightly or locally diseased carcasses, the flesh from which has experimentally given negative results, and the more extensively diseased carcasses the meat from which has been proved to be infectious.

Tuberculin Test.

Although the subcutaneous tuberculin test in bovines, when correctly applied, proves reliable in about 97 per cent. of cases, there still remains a prejudice against this form of testing among the farmers and dairymen which has been difficult to overcome.[2, 6, 7, 37]

It is therefore natural that any new method which may facilitate the diagnosis of tuberculosis should be accompanied by great interest. Of the various biological methods of diagnosing tuberculosis, the greatest interest has been manifested in the last few months in the cuti-reaction of von Pirquet and the ophthalmo-reaction of Wolff-Eisner and Calmette.

The very favorable results which were reported from the application of both of the above-mentioned methods excited a great deal of interest among investigators, and soon numerous results of the experiments were published, which, however, were not uniformly favorable for either of these tests. The best results, however, were apparently obtained from the ophthalmo-reaction, and if this method should prove reliable, the simple method of its application would greatly aid in the early diagnosis of tuberculosis. Thus up to the present time the ophthalmo-tuberculin test has been principally applied to the human, especially infants, and while the results obtained in these tests are very encouraging, the reactions and failures were never, or only in the earliest instances, verified by post-mortem examination. It appears therefore desirable to test the reliability of this reaction on animals, in which the reaction may be controlled by autopsies or by the known reliability of subcutaneous tuberculin test. This has been undertaken by various investigators, including the writers, and while many of the results obtained were unsatisfactory, the general findings are somewhat encouraging. The different results which were obtained might possibly be attributed to the various preparations of tuberculin which have been employed and the different strengths in which the tuberculin was applied. The varied results thus far obtained make the reliability of the ophthalmo-tuberculin test for the diagnosis of tuberculosis in bovines questionable, and it will be necessary to perfect this method by further experiments. If this method of testing should

prove as reliable as the subcutaneous tuberculin test, it would unquestionably greatly facilitate the eradication of tuberculosis, inasmuch as the farmers and dairymen would not object to this external method of applying the test as they do to the subcutaneous tuberculin injection.

The reliability of the latter test has now been fully established, and its use upon cattle as a diagnostic agent has become quite universal. Experiments of the bureau recently made upon hogs show that tuberculin may be used upon these animals with results equal in certainty to those derived from cattle whenever they can be kept perfectly quiet during the test, but this requires considerable care and attention, making it improbable that many diagnoses of tuberculosis in hogs will be made by its use.[27]

Infection of Cattle.

The danger from tuberculosis is not confined to the dairy and farming regions of the country. It menaces the cattle on the ranges of the great plains and Rocky Mountain regions as well.[18] Heretofore it has been generally believed that the ravages of this disease were confined to cattle that pass at least a portion of the year in stables. This conclusion is now disproved by the spread of tuberculosis in Argentina, Australia, and New Zealand, where the cattle pass their entire lives in the open air, and where the climate is favorable to the cure of tuberculosis in man, as is particularly the case in parts of Australia. The disease seems to have been mainly conveyed to these ranges by pure-bred cattle that have been turned with the native cattle of the various regions for the purpose of improving the quality of the stock. Vigorous application of the tuberculin test to all improved cattle intended for range life before they are released with range animals, and the destruction of all reactors, while it will not mitigate the damage already done, will at least serve to check the constant stream of tuberculous breeding stock which is now being released upon the open pastures of the west.

In the year 1900 an inspector of the bureau was stationed in Great Britain for the purpose of applying the tuberculin test to all European cattle intended for shipment to this country for breeding purposes.[19] This step met with a great deal of opposition from all sides, but since by means of these tests 229 tuberculous cattle were prevented from coming to this country during the first two years of the enforcement of the test, the real value of the work to the stock interests of this country is at once very manifest. The facts disclosed during the early years of the enforcement of the test demonstrated very clearly that none of the regulations were unreasonable or unduly severe, but that they were necessary for the protection of the herds of the United States.

Similarly the Bureau has had occasion to tuberculin test a large number of pure-bred cattle intended for shipment to Canada, Argentina, Uruguay,

and other countries requiring such inspection of breeding cattle, and the breeders of thoroughbred cattle are at the same time being encouraged and assisted by the bureau in the work of freeing their herds from tuberculosis. Through this class of testing new centers of infection are located, advice is furnished to the breeders as to the best methods of controlling the disease, and the State authorities are notified that they may take such action as they deem advisable.

Immunization Experiments.

Some time ago reports began to reach us from Europe and this country of the successful immunization of young cattle against tuberculosis by Pearson and Gilliland, von Behring, Koch, Lignières, and other investigators. While their methods were different, their systems of operation were based upon similar processes, that is, they all injected the calves with tubercle bacilli having a low degree of virulence, using bacilli having either human or bovine origin. The differences which existed in their several methods were to be found mainly in the manner of administering the injections, and in the number of applications considered necessary for the production of adequate protection of the animal. There was also some difference in the preferred age at which the calves were to be treated.

In order that the most promising of these methods for immunizing cattle against tuberculosis might be tested, and that new and needed features might be perfected and proved, a number of calves and hogs were purchased by the bureau, and were submitted to the inoculations as recommended by the most prominent investigators, receiving differing amounts of living tubercle organisms from varied sources. Numerous check animals were also used and were submitted to the same exposure to virulent tubercle bacilli that the immunized calves and hogs with which they were grouped received. In this manner, by ultimately slaughtering both the inoculated and check animals, the amount of protection afforded by the various treatments can be accurately determined. The lot of animals showing the greatest proportion of resistant animals at the completion of this experiment will be selected as representing the most feasible and effective method of immunizing cattle and hogs against tuberculosis.

It is very desirable that perfect protection be afforded the animals, if possible, by a single inoculation of the protective virus. It is therefore one of the aims of the present work to select cultures possessing the greatest degree of virulence compatible with safety to the animals treated, and at the same time to select some part of the animal's body as the seat of the injection that is but little liable to convey the microörganisms to the glandular system, where they might readily cause the establishment of a generalized case of the very disease which it was so much desired to guard against.

These experiments in immunization are not yet completed, and no report of results can therefore be made.

Another experiment somewhat related to the immunizing tests just outlined has been undertaken, in which a number of cattle that have reacted to the tuberculin test, thus proving that they are affected with tuberculosis, have been purchased, and are being treated by various methods with living and sterilized cultures of tubercle bacilli for the purpose of perfecting, if possible, some method of treatment which will serve to check the advance of the disease.

Eradication.

Although tuberculosis is extremely insidious in its attack and may remain unsuspected for a long period of time in the body of the animal in which it has become located, it is a disease whose extension throughout a herd of animals may be prevented if careful restrictive measures are persistently applied. To control tuberculosis, however, it is necessary to thoroughly understand the nature of the disease, and to appreciate fully the more common routes by which tubercle bacilli are conveyed to the domestic animals, and also the most certain methods of detecting its presence and of removing the danger which must exist wherever tuberculous animals are found.

The application of tuberculin as a reliable diagnostic agent has made it possible to separate the tuberculous from the healthy members of the herd, and has proved to be a great assistance in the work of eradicating tuberculosis from the farm. If the cattle in a dairy herd are tested accurately once a year, and the reacting animals are at once removed and the premises then thoroughly disinfected, the stables may be successfully freed from tuberculosis. This has been accomplished at the Government Hospital for the Insane, where in the year 1900, under bureau test, 79 cows gave a decided reaction to tuberculin out of 102 tested; and also at the National Soldiers' Home, where there were 53 reactions in a herd of 63. These reactors were removed, the stables carefully renovated and disinfected, and all new cows purchased for the completion of the required quota of milk-producers were subjected to the tuberculin test before being admitted to the premises. In the succeeding years the usual dairy exigencies required the disposal of several cows annually, but all newcomers were rigidly examined to make sure that they brought with them no tubercular infection into either of these herds, which now number over 300 animals. The tuberculin test was given annual application in both herds, with the result that a few reactions occurred for about three years, since which time no cases have been detected. As tuberculosis seldom attacks the swine of a farm except through tuberculous cattle, the cleansing of the dairy herd and quarters, with proper attention to general disinfection and to the purchase of new swine, will usually result

in the disappearance of tuberculosis from among the hogs. It is manifest, from what has already been stated, that no creamery refuse should be fed to hogs under these conditions until it has been thoroughly sterilized.[31]

The States of Iowa and Minnesota have enacted laws requiring each creamery management within their jurisdictions to pasteurize all skimmed or separated milk from their establishments before returning it to the farm patrons. If similar laws could find general enforcement, tuberculosis of hogs would rapidly be diminished, as it must be conceded that the by-products of the public creameries offer at present one of the most dangerous sources of tubercular infection for these animals.

Congress has recently granted power to the Department of Agriculture to examine and report upon the results obtained from the use of various kinds of tuberculin sold in this country. This power of keeping the public informed upon the value of such an important biological product as tuberculin came none too soon, for worthless tuberculin has been found on the market, and there can be no question that many inconsistent results—results which were embarrassing to the testers, and caused dissatisfaction among the stockmen—can be explained by the inertness of certain of these products.

Since 1893 the bureau has been constantly assisting some of the States in controlling tuberculosis, preparing and distributing tuberculin to their State and municipal health authorities and sanitary officers, but during the last few years the demand has been greatly increased, 215,000 doses having been sent out in the past year.

Before adjourning last May, Congress made an appropriation of $25,000 for the study of the extent and prevalence of tuberculosis in the United States. In order to determine these facts both quickly and accurately the work will necessarily be undertaken in those States where coöperation can be obtained, not only from the standpoint of organization and funds, but also with reference to having proper laws regarding the entry of tuberculous cattle; in other words, to help those States that are endeavoring to help themselves. Already several veterinary inspectors have been stationed at important shipping points for the purpose of accommodating shippers who desire to have cattle tested which are destined for States requiring the tuberculin test certificates, and while this work at present is entirely voluntary, the establishment of a large number of such points would probably follow if more States had compulsory tuberculin test laws upon their statutes. It will therefore be seen that a constantly increasing activity relative to the suppression of tuberculosis is being manifested by the Bureau of Animal Industry, and the day is not far distant when all breeding and dairy cattle crossing State lines will be required to show a tuberculin test bill of health. If the States themselves would all obtain such laws, the enforcement of an order for the testing

of the above classes of cattle entering interstate commerce, and the appointment of veterinary tuberculin testers by the government to all the principal shipping centers, would be more likely to follow. And it would not be long before the country would be divided into districts with a chief inspector in charge, for the eradication of tuberculosis, as it is at present in the south for the repression of the fever tick, and in the west for the extermination of the cattle and sheep scab mites. The effort to control tuberculosis is a most reasonable and proper one, and if conservatively directed, should receive the support of every friend of the cattle industry.

In conclusion it may be stated that the bureau is ready to continue its investigations, that the subject of immunization and eradication will continue to receive its attention, and that its efforts for the cleansing of infected stables and localities, together with its supervision over meats and dairy products, will not be lessened in the least during coming months and years.

BIBLIOGRAPHY.

1. 1892—Smith, Theobald: Experiments with milk of tuberculous cattle. U. S. Dept. of Agr., Bureau of Animal Industry, 8th and 9th Ann. Repts., 1891–1892.
2. 1894—Salmon, Daniel E.: Investigations concerning bovine tuberculosis, with special reference to diagnosis and prevention. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 7.
3. 1896—Smith, Theobald: Two varieties of tubercle bacilli from mammals. U. S. Dept. of Agr., Bureau of Animal Industry, 12th and 13th Ann. Repts., 1895–1896.
4. 1896—de Schweinitz, Emil A., and Dorset, Marion: The growth of the tuberculosis bacillus upon acid media. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 13.
5. 1896—de Schweinitz, Emil A., and Schroeder, Ernst C.: Further experiments with an attenuated tuberculosis bacillus. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 13.
6. 1896—de Schweinitz, Emil A.: The effect of tuberculin injections upon the milk of healthy and diseased cows. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 13.
7. 1896—Curtice, Cooper: The detection of tuberculosis in cattle. U. S. Dept. of Agr., Bureau of Animal Industry, 12th and 13th Ann. Repts., 1895–1896.
8. 1898—Dawson, Charles F.: The vitality and retention of virulence of certain pathogenic bacteria in milk and its products. U. S. Dept. of Agr., Bureau of Animal Industry, 15th Ann. Rept.
9. 1898—de Schweinitz, Emil A.: Some results in the treatment of tuberculosis with antituberculosis serum. U. S. Dept. of Agr., Bureau of Animal Industry, 15th Ann. Rept.
10. 1898—de Schweinitz, Emil A., and Dorset, Marion: The composition of the tuberculosis and glanders bacilli. U. S. Dept. of Agr., Bureau of Animal Industry, 15th Ann. Rept.
11. 1898—de Schweinitz, Emil A., and Dorset, Marion: Notes on the fats contained in the tuberculosis bacilli. U. S. Dept. of Agr., Bureau of Animal Industry, 15th Ann. Rept.
12. 1898—de Schweinitz, Emil A., and Dorset, Marion: The mineral constituents of the tubercle bacilli. U. S. Dept. of Agr., Bureau of Animal Industry, 15th Ann. Rept.
13. 1898—de Schweinitz, Emil A.: The attenuated bacillus tuberculosis: Its use in producing immunity from tuberculosis in guinea-pigs. U. S. Dept. of Agr., Bureau of Animal Industry, 15th Ann. Rept.

14. 1898—Dorset, Marion: A new stain for bacillus tuberculosis. U. S. Dept. of Agr., Bureau of Animal Industry, 15th Ann. Rept.
15. 1901—Dorset, Marion: Note on branched forms of tubercle bacilli found in cultures. U. S. Dept. of Agr., Bureau of Animal Industry, 18th Ann. Rept.
16. 1901—Dorset, Marion: The use of eggs as a medium for the cultivation of bacillus tuberculosis. U. S. Dept. of Agr., Bureau of Animal Industry, 18th Ann. Rept.
17. 1904—Salmon, Daniel E.: Reports on bovine tuberculosis and public health. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 53.
18. 1901—Salmon, Daniel E.: Danger to range cattle. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 32, p. 16.
19. 1901—Salmon, Daniel E.: The tuberculin test of imported cattle. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 32.
20. 1902—Harrison, F. C.: The duration of the life of the tubercle bacillus in cheese. U. S. Dept. of Agr., Bureau of Animal Industry, 19th Ann. Rept.
21. 1903—Schroeder, Ernst C., and Cotton, William E.: Spread of tuberculosis among healthy cattle upon exposure to tuberculous cattle. U. S. Dept. of Agr., Bureau of Animal Industry, 20th Ann. Rept.
22. 1903—de Schweinitz, Emil A., and Dorset, Marion: A chemical examination of various tubercle bacilli. U. S. Dept. of Agr., Bureau of Animal Industry, 20th Ann. Rept.
23. 1903—Dorset, Marion: The desirability of phosphates as an addition to culture-media for tubercle bacilli. U. S. Dept. of Agr., Bureau of Animal Industry, 20th Ann. Rept.
24. McBryde, Charles N.: Certain variations in the morphology of tubercle bacilli of bovine origin. U. S. Dept. of Agr., Bureau of Animal Industry, 20th Ann. Rept.
25. 1903—Mohler, John R.: Infectiveness of milk of cows which have reacted to the tuberculin test. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 44.
26. 1904—de Schweinitz, Emil A.; Dorset, Marion; Schroeder, Ernst C., and Cotton, William E.: Experiments concerning tuberculosis. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 52.
27. 1906—Schroeder, Ernst C., and Mohler, John R.: The tuberculin test of hogs and some methods of their infection with tuberculosis. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 88.
28. 1906—Schroeder, Ernst C., and Cotton, William E.: Experiments with milk artificially infected with tubercle bacilli. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 86.
29. 1906—Salmon, Daniel E.: Tuberculosis of the food-producing animals. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 38.
30. 1906—Mohler, John R., and Washburn, Henry J.: The susceptibility of tubercle bacilli to modification. U. S. Dept. of Agr., Bureau of Animal Industry, 23d Ann. Rept.
31. 1907—Mohler, John R., and Washburn, Henry J.: Tuberculosis in hogs, with special reference to its suppression. Address delivered before the American Veterinary Medical Association.
32. 1907—Schroeder, Ernst C., and Cotton, William E.: The danger from tubercle bacilli in the environment of tuberculous cattle. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 99.
33. 1907—Mohler, John R., and Washburn, Henry J.: A comparative study of tubercle bacilli from varied sources. U. S. Dept. of Agr., Bureau of Animal Industry, Bulletin No. 96.
34. 1907—Schroeder, Ernst C.: The unsuspected but dangerously tuberculous cow. U. S. Dept. of Agr., Bureau of Animal Industry, Circular No. 118.
35. 1907—Mohler, John R.: The danger of infection from tuberculous meat. Address delivered before the Consumer's League of New Jersey.
36. 1908—Schroeder, Ernst C., and Cotton, William E.: Tubercle bacilli in butter: Their occurrence, vitality, and significance. U. S. Dept. of Agr., Bureau of Animal Industry, Circular No. 127.
37. 1907—Mohler, John R.: The tuberculin test: Its method of application, value of stability. U. S. Dept. of Agr., Bureau of Animal Industry, 24th Ann. Rept.
38. 1908—Mohler, John R.: Conditions and diseases of the cow injuriously affecting the milk. U. S. Treas. Dept.—Public Health and Marine Hospital Service, Hygienic Laboratory, Bulletin No. 41.

39. 1907—Sanitary relations of the milk-supply. [Report of the committee on sanitary relations to a conference appointed by the Commissioners of the District of Columbia to consider and report upon the local milk-supply.] U. S. Dept. of Agr., Bureau of Animal Industry, Circular No. 111.

Sanitary milk production. Report of a conference appointed by the Commissioners of the District of Columbia, with accompanying papers. U. S. Dept. of Agr., Bureau of Animal Industry, Circular No. 114.

Revista de las Investigaciones Recientes Hechas por el Departamento de la Industria Animal de los Estados Unidos.—(MOHLER Y WASHBURN.)

El Departamento de la Industria Animal desde su fundación se ha ocupado constantemente del problema de la tuberculosis, principalmente sobre la afección de esta enfermedad en nuestros animales domésticos, más también ha prestado atención á la íntima relación entre la tuberculosis en los animales y el hombre, tampoco se han menospreciado los peligros que el contacto del hombre con los animales tuberculosos trae consigo, lo mismo que la alimentación de leches, carnes, etc., de animales tuberculosos. Los datos demuestran que desde 1895 y 1896 se encuentran las primeras notificaciones sobre las diferentes formas del bacilo de la tuberculosis de origen bovino y humano publicadas por el departamento. En ese tiempo no se pretendió sostener que el bacilo bovino y humano eran intertransmisibles, y no fue sino hasta que esta cuestión fue presentada prominentemente ante el público en 1901, que este punto fue investigado. Este último trabajo justifica la división del bacilo de la tuberculosis "en tipos" mas tambien se probó que no hay caracteres poseidos por algunos de estos tipos del bacilo de la tuberculosis que se encuentran en unas especies, que no pueda encontrarse en otras bajos ciertos condiciones favorables.

La atención del departamento fue dirigida en los primeros años á eliminar la tuberculosis de los rebaños de lecherias del pais, y á fin de hacer esto, se vió la necesidad de tener á la disposición primera calidad de tuberculina y hacia este fin se inauguro la preparación de este producto.

Medios de culturas especiales para el crecimento estudio del bacilo de la tuberculosis fueron hechos, y se hicieron extensas investigaciones con numerosas culturas obtenidas del hombre, del ganado ó de las aves. Muchas investigaciones se han hecho en cuanto á la transmisión de la tuberculosis entre los animales por medio del contacto de estos en los establos y rebaños, también sobre el contagio en los animales sanos guardados en los establos habitados previamente por animales tuberculosos: también se han hecho experimentos para determinar la capacidad del bacilo de la mantequilla y el queso bajo las condiciones del mercado. El tiempo necesario para destruir el bacilo de la tuberculosis bajo la acción de los rayos solares, también ha recibido cuidadosos estudios.

La cuestión de la inmunidad he recibido mucha atención. Primeramente todas las tentativas para producir la inmunidad fueron basadas sobre la aplicación del suero, más las investigaciones últimas han hecho abandonar el uso del suero y la atención se ha dirigido al uso de las culturas del bacilo de la tuberculosis vivo, mas en un estado atenuado.

Con relación al estudio de la tuberculosis en los animales, y su relación con la salud pública, un ancho campo de investigaciones se ha abierto y el examen de las carnes de los animales tuberculosos, con el objeto de determinar los peligros de estos alimentos, han recibido nuestra constante atención.

Muchos informes valiosos se han adquirido por medio de averiguar el origen de los animales tuberculosos que se encuentran en los rastros, y los resultados de estos trabajos dan suficientes basas para esperar que el número de animales tuberculosos, enviados á los mercados públicos, sean muy pronto materialmente reducido, puesto que se ha encontrado que el por ciento de las haciendas envian que animales tuberculosos á los mercados centrales es comparativamente poco.

Revue d'investigations récentes sur la tuberculose faites par le Bureau de l'Industrie animale des États-Unis.—(MOHLER ET WASHBURN.)

Depuis son organisation, le Bureau de l'industrie animale débat constamment des problèmes présentés par la tuberculose, surtout en ce qui touche nos animaux domestiques, mais jamais il n'a oublié l'intime parenté entre la tuberculose chez les animaux et la tuberculose chez les hommes, ni le danger qui menace l'humanité par le contact avec les animaux, et par le lait et la viande tuberculeux. Les archives du bureau montrent que la première notice donnée au public de la possession de caractéristiques différentes par les bacilles tuberculeux de sources humaines et bovines parut dans les rapports du bureau pour 1895 et 1896. Aucun effort n'a été fait, alors, pour pretendre que les bacilles tuberculeux humains et bovins n'étaient pas intertransmissibles, et c'est seulement quand cette idée à été soulevée avec éclat devant le public, en 1901, que d'autres investigations ont été faites. Ce dernier travail a justifié la division des bacilles tuberculeux en types, mais il a aussi prouvé qu'il n'y a pas de caractère possédé par n'importe lequel de ces types dans une foule qui ne puisse se retrouver dans une autre foule dans des conditions favorables.

Pendant ces premières années, l'attention du bureau a été dirigée sur la nécessité d'extirper la tuberculose des troupeaux du pays; pour faire cela on a inauguré la manufacture d'une tuberculine modèle et sûre.

Des milieux spéciaux de culture pour la croissance et l'étude des bacilles

tuberculeux ont été préparés et des recherches considérables ont été faites avec de nombreuses cultures fournies par l'homme, le bétail et l'oiseau. De grandes recherches ont été faites sur les méthodes par lesquelles la tuberculose peut être communiquée d'animaux à animaux par contact direct ou par le contact de l'étable ou étaient des animaux tuberculeux. D'autres essais ont été faits pour déterminer combien de temps les bacilles tuberculeux peuvent garder leur virulence dans du fromage ou dans du beurre, et le temps d'exposition au soleil nécessaire pour detruire les bacilles.

La question d'immunité a reçu beaucoup d'attention. Dabord tout essai de production d'immunité était basé sur l'application du sérum, mais des chercheurs plus modernes ont abandonné le sérum et l'attention se porte surtout sur l'emploi de cultures vivantes, mais attenuées, de bacilles tuberculeux.

L'étude des rapports de la tuberculose animale avec la santé publique a ouvert un vaste champ d'investigation et l'on s'est adonné soigneusement à l'examen de la viande d'animaux tuberculeux pour savoir le degré de mal qu'elle peut faire comme nourriture.

On a obtenu beaucoup de renseignements précieux en suivant la trace des animaux tuberculeux depuis l'abattoir jusqu'aux fermes d'où ils ont été envoyés, et les registres de ce travail donnent l'espoir que le nombre des animaux tuberculeux envoyés aux marchés sera bientôt réduit, et on a trouvé que le pour cent de fermes qui envoient des animaux tuberculeux aux grandes marchés est comparativement petit.

Übersicht von neuerlichen Untersuchungen über Tuberkulose, ausgeführt von The United States Bureau of Animal Industry.—

(Mohler und Washburn.)

Seit seiner Gründung ist das Bureau of Animal Industry ständig mit den Tuberkulose-Problemen im Kampfe gelegen, besonders in Bezug wie diese Krankheit unsere Haustiere angreift, aber zu keiner Zeit hat es das intime Verhältnis zwischen der Tuberkulose in den Tieren und der Tuberkulose in dem Menschen vergessen; auch ist die Gefahr, welche die Menschheit durch Berührung mit tuberkulösen Tieren und durch den Genuss von tuberkulöser Milch oder tuberkulösem Fleische droht, niemals vernachlässigt worden.

Aus den Berichten der Vergangenheit, die dieses Werk des Bureaus in Bezug auf die Forschungen in diesem Gegenstande decken, kann man sehen, dass die erste Notiz, welche das Publikum jemals von der Verschiedenheit von Eigenschaften der Tuberkelbazillen des Rindes von denen des Menschen

erhielt, in den Bureau-Berichten der Jahre 1895 und 1896 erschien. Zu jener Zeit wurde kein Versuch einer Behauptung gemacht, dass die Tuberkelbazillen vom Menschen und vom Rinde nicht leicht übertragbar wären, und nur wenn im Jahre 1901 die Sache in hervorragender Weise vor das Publikum gebracht wurde, wurde der Gegenstand wieder aufgenommen und weiteren Forschungen das Wort geredet. Diese spätere Arbeit rechtfertigt die Einteilung von Tuberkelbazillen in "Typen," aber es wurde auch bewiesen dass es, keine Eigenschaft giebt, die in einem der Typen der Tuberkelbazillen ist, dass sie nicht auch in einem anderen Typus unter günstigen Umständen gefunden werden könnte.

Die Aufmerksamkeit des Bureaus wurde in seinen frühen Jahren des Bestehens auf die Wünschenswertigkeit der Ausrottung der Tuberkulose aus den Milchherden des Landes gelenkt, und um dieses zu thun, wurde auf die Nothwendigkeit eines gleichmässigen und verlässlichen Tuberkulins hingewiesen, und die Herstellung dieses Produktes wurde angefangen.

Besondere Kulturmedien für die Zucht und das Studium von Tuberkelbazillen wurden später zubereitet, und umfangreiche Untersuchungen wurden mit zahlreichen Kulturen gemacht, die von dem Menschen, dem Rinde und von Vögeln erlangt worden waren. Weitverbreitete Forschungen wurden gemacht über die Methode, durch welche die Tuberkulose von einem Tiere zum andern mittelst Berührung in den Ställen und Höfen, und auch durch die Berührung mit Stallutensilien in Ställen, in denen vorher tuberkulöse Tiere gelebt haben, übertragen werden könnte. Sehr eng verbunden mit diesen Proben sind auch die für die Bestimmung der Länge der Zeit, während welcher die Tuberkelbazillen ihre Virulenz beibehalten, während sie in der Butter und dem Käse unter gewöhnlichen Marktverhältnissen sich aufhalten. Die Länge der Zeit, in der die Tuberkelbazillen dem Sonnenlicht ausgesetzt sein müssen, um vernichtet zu werden, ist ebenfalls in das Gebiet der sorgsamen Forschung gezogen worden.

Auch die Frage der Immunisierung hat grosse Aufmerksamkeit auf sich gelenkt. Zuerst gründeten sich alle Versuche zur Hervorbringung der Immunität auf die Anwendung von Serum, aber spätere Studien haben den Gebrauch von Serum unterlassen, und die Aufmerksamkeit wurde hauptsächlich dem Gebrauche von lebenden aber abgeschwächten Kulturen von Tuberkelbazillen zugewandt.

Mit dem Studium der Beziehung der Tuberkulose in Tieren zur öffentlichen Gesundheitslehre hat sich ein weites Forschungsgebiet eröffnet, und man verharrte bei der Untersuchung von Fleisch von tuberkulösen Tieren mit dem Zwecke, den Grad der Schädlichkeit als ein Nahrungsmittel festzustellen.

Viel Auskunft wichtiger Natur wurde erhalten, indem man tuberkulösen Tieren von den Schlachthäusern zurück zur Farm, von der sie gesandt

worden waren, nachspürte; die Berichte dieses Werkes geben zur Hoffnung Veranlassung, dass die Anzahl von tuberkulösen Tieren, die zum Verkaufe gebracht werden, bald sich wesentlich verringere, da man gefunden hat, dass der Prozentsatz der Firmen, die tuberkulöses Material zu Markte schicken, verhältnismässig niedrig ist.

Before declaring the Section adjourned, the president announced that the afternoon session would be held in the Assembly Hall, and would be a joint session with Section I, to discuss—

THE RELATIONS BETWEEN TUBERCULOSIS OF ANIMALS AND OF MAN.

Joint Session of Sections I and VII.

The Joint Session of Sections I and VII was called to order, in the Assembly Hall, at half past two o'clock, Wednesday afternoon, September 30th, by Dr. William H. Welch, president of Section I. Dr. Leonard Pearson, president of Section VII; Prof. Robert Koch, of Berlin; Prof. J. George Adami, of Montreal, were on the platform. Dr. Welch announced the subject of the joint discussion, "The Relations of Human and Bovine Tuberculosis," and called on Prof. Robert Koch to open the discussion.

THE RELATION OF HUMAN AND BOVINE TUBERCULOSIS.

By Prof. Robert Koch,
Berlin.

The question whether or not human and bovine tuberculosis are identical is indeed of high theoretical interest. But the practical importance of the question which concerns the prevention of tuberculosis is of far greater importance. For this reason I will confine myself solely to a consideration of the practical side of the subject.

To Theobald Smith, of Harvard, belongs the credit of having been the first to call attention to certain differences between the tubercle bacilli found in man and in cattle. It was his work which induced me to take up this same study. In coöperation with Schütz, I have undertaken a series of experiments for which we selected cattle, these animals being specially suited for such work.

The results of these experiments have led me to conclusions which I have first communicated to the British Congress on Tuberculosis in 1901. They are in substance as follows:

1. The tubercle bacilli of bovine tuberculosis are different from those of human tuberculosis.

2. Human beings may be infected by bovine tubercle bacilli, but serious diseases from this cause occur very rarely.

3. Preventive measures against tuberculosis should therefore be directed primarily against the propagation of human tubercle bacilli.

I did not expect that my personal views on the relation of human and bovine tuberculosis would be accepted as final, but I have asked that the experiments of Schütz and myself be repeated. This has been done since by a host of investigators.

Many sources of error must be considered in research on tuberculosis, and only work in which these errors have been definitely excluded can be accepted as conclusive.

My personal estimate of the value of the work of other authors depends on how far these errors have been eliminated. For this reason I will now summarize briefly the requisites for conclusive work on the differentiation between human and bovine tuberculosis.

The animals used for experimentation must be entirely free from spontaneous tuberculosis. Since the earliest stages of tuberculous infection cannot be recognized with certainty, the source of error arising therefrom is only to be overcome by experimenting on long series of animals. This is especially true of investigations on cattle, as in them tuberculin proves the presence of tuberculosis not immediately after infection, but only after the lapse of a certain time. Experiments conducted on too small a number of animals carry no weight whatever. Single exceptions in extensive series of experiments depend, as a rule, on experimental error. They should be valued accordingly or the whole series repeated.

During the entire period of investigation the animals, that is, cattle, rabbits, and guinea-pigs, must be protected rigidly against tuberculous infection. This applies especially to bovine tuberculosis, as the animals are particularly susceptible to this form of the disease, and every experimental error vitiates the results in favor of bovine tuberculosis. Special care must be observed in the separation of animals which have been inoculated with bovine tuberculosis obtained from men under the belief that one is dealing with the human form of the disease. Such animals must never be allowed to come in contact with those inoculated with true human tuberculosis.

Inoculation of animals should be made subcutaneously with weighed quantities of a culture of the tubercle bacillus. Experience has shown that the best results for infection are obtained with doses of 10 mg. Tissue substance must not be used directly, as it contains the tubercle bacilli in irregular distribution. The results obtained thereby are consequently not comparable. It is not practicable to use the tubercle bacilli in too large doses or to make intravenous or intra-abdominal injections, as by such applications non-virulent or even dead tubercle bacilli may produce lesions resembling tuberculosis and thus simulate positive results.

In the preparation of the cultures it is necessary that even while obtain-

ing crude material all precautions must be followed which serve to prevent a contaminating infection either during the inoculation or in the making of the cultures. If it is impossible to make the culture of the bacilli immediately from tuberculous organs,—and this is usually the case,—the material must first be inoculated into guinea-pigs. This is permissible, since it has been proved that a single passage through the body of the guinea-pig does not markedly alter the characteristics of the tubercle bacillus. For infection experiments the culture obtained from the organs of the inoculated guinea-pigs must not be too old, and should be used, if possible, in the first or second generation.

For standardization of virulence rabbits may be used, as a rule, in place of cattle. In all doubtful cases, however, the test must be made on a corresponding number of cattle. In determination of the virulence of the culture of tubercle bacilli it is imperative to distinguish between progressive and regressive processes. For this reason experiments must be continued over a long enough time to enable one to make the differentiation with reasonable certainty. If the animals are killed too early, it is usually impossible to make certain whether the tuberculous processes found are of a progressive nature or not.

It is well to appreciate that mixed infection by human and bovine tuberculosis may occur. In such cases, if proper precaution is not taken in animal experiments, bovine tuberculosis will always gain supremacy and lead to error.

With regard to experiments in feeding phthisical sputum, the following points must be observed:

If under all conditions the so-called sputum contained only tubercle bacilli of the patient in question, the conduct of these experiments would be relatively simple. But every one who has examined sputum under the microscope knows that it is mixed nearly always with particles of food. These, of course, may contain milk and butter which themselves may harbor tubercle bacilli derived from cattle. I consider the experimental error caused thereby of such significance that only those experiments on the occurrence of the bacillus of bovine tuberculosis in sputum can be regarded as conclusive from which this error has been absolutely excluded. In order not to be misunderstood on this point, which is to me of paramount importance, may I be allowed to give the following illustration?

The British Commission which is engaged in the investigation of the relation between human and bovine tuberculosis, has conducted experiments on the feeding of phthisical sputum to cattle. Three calves were fed over a period of one hundred and twenty days, during which time each received a total of 30 liters of sputum. A fourth calf received 21 liters in ninety-one days. After slaughter there were found in these animals isolated calcified

nodules, but no traces of the progressive lesions so characteristic of bovine tuberculosis.

On the other hand, a cow was fed with sputum for two hundred and nine days. When the animal was killed at the end of this time, a progressive tuberculous process was found in the mesenteric and portal glands. Here there appeared to be a positive result of the feeding experiment. However, in simultaneous experiments, in one of which a cow was fed the same sputum for three hundred days, and in the other two pigs, negative results were obtained. Adding to these the four negative experiments on calves, and considering other similar experiments previously performed,—for example, those by myself and by Möller in Belzig,—I cannot but believe that the above result is merely an exceptional case in a large series. The British Commission counts this among its positive results. In my own opinion this is not justified. It seems to me highly probable that in this case an experimental error has slipped in, and that the cow was infected by tubercle bacilli contained in milk or butter which had been mixed accidentally with the sputum.

If such feeding experiments are to be conclusive, it is absolutely essential that sputum collected from various patients must not be used, as has been done probably in all former experiments. The sputum of only one definite consumptive should be fed to one definite animal. Obviously, care should be taken that the patient in question receives during the experiment neither milk nor butter. Furthermore, in order to exclude all error, and to prove that one is dealing with the continuous production of tubercle bacilli by the patient and not with an accidental contamination of his sputum, the experiment must be so arranged that it can be repeated from time to time with the sputum of the same patient.

The experiments carried on at the Kaiserliche Gesundheitsamt in Berlin are the only ones which fulfil in every way the foregoing experimental requirements. Those of the British Commission fail in several respects, and all other work which has come to my notice answers these requirements so poorly that I can grant them no weight, at least as regards the occurrence of bovine tuberculosis in man.

Before taking up the results which have been reached by investigations hitherto, I should like to call attention to the following points:

Many of my opponents have made strenuous efforts to prove that the tubercle bacilli in man and those in cattle cannot be of different species, and they imagine that they can thus refute my contentions. This, however, is a perfectly useless endeavor. I have never held that we are dealing with two distinct species, but have only stated that they differ from each other in certain characteristics, characteristics which are of the greatest importance in combating tuberculosis. Whether these differences justify us in speaking of special varieties or even species is, from my point of view, quite

irrelevant. I am concerned, as I have previously stated, only with the practical significance of the differences between human and bovine tuberculosis.

A very convenient expedient in this dilemma has been suggested by Kossel. He does not use the terms "species" or "variety," but speaks of different "types." As this appears quite harmless, I shall adopt it myself, and use the terms "human type" and "bovine type."

Others of my opponents have attempted to refute me by showing that the bacillus of the human type may be transformed into the tubercle bacillus of the bovine type, and vice versâ, by passages through animals or by cultivation under artificial conditions. In this connection I can merely repeat that I am interested only in the practical significance of the difference between the two types of tubercle bacilli. For our purposes, that is, for combating tuberculosis, it is absolutely without significance what changes tubercle bacilli will undergo after being passed through a series of animals or during cultivation under some artificial conditions. Those men who consume milk and butter do not hold back and make cultural or animal experiments: they eat them in the fresh, unchanged condition. In my opinion, therefore, we are concerned here with the properties of the fresh and unchanged tubercle bacillus only. I do not deny that cultural transformations may be made with these as well as with other bacteria, but this is a question of purely theoretical value. I shall therefore lay it aside.

We may now take up the results of recent investigations. I believe that what has come to my knowledge so far may be summarized briefly as follows:

All competent investigators agree that the tubercle bacilli of human origin differ from the tubercle bacilli of cattle, and that, consequently, we must differentiate between a typus humanus and a typus bovinus. The British Commission also admits the existence of these differences, but as some of their cultures showed definite changes in their characteristics after passage through animals and various cultivations, they have differentiated a third group, which they call "unstable." As I have repeatedly emphasized, it is not of the slightest importance to us whether, after animal inoculation or breeding experiments, the tubercle bacillus is stable or unstable. What concerns us is behavior in the fresh condition. I am therefore unable to accept this third group of the British Commission, and I am satisfied with their admission that the fresh tubercle bacilli of the human type differ distinctly from those of the bovine type.

The tubercle bacilli of the human type are characterized by the fact that they grow rapidly and abundantly in a thick layer on glycerin serum. They are virulent to guinea-pigs, slightly virulent to rabbits, and almost non-virulent to cattle.

The tubercle bacilli of the bovine type grow very slowly and in a thin layer on glycerin serum; they are of equally high virulence to guinea-pigs,

rabbits, and cattle. To my knowledge, the bacilli of the human type have never been demonstrated in cattle.

The bacilli of the bovine type, on the other hand, can occur in man. They have been found in the cervical lymph-glands and in the intestinal tract. With few exceptions, however, these bacilli are but slightly virulent for man and remain localized. The few known cases in which the bovine tuberculosis is said to have produced a general and fatally progressive tuberculosis in man appear to me not to be above suspicion.

No special proof is required if I say that these results constitute the confirmation of the statements which I made at the London Congress.

In closing, I have still one point to discuss which seems to me of high importance.

Of all human beings who succumb to tuberculosis, eleven-twelfths die of consumption or pulmonary tuberculosis, and only one-twelfth of other forms of the disease. One would have expected, therefore, that those investigators who are interested in establishing the relations between human and bovine tuberculosis would have searched for bacilli of the bovine type preferably in cases of pulmonary tuberculosis. This, however, has not been the case. Evidently animated by the desire to bring together as many cases as possible of bovine tuberculosis in man, they have investigated particularly cases of gland and intestinal tuberculosis, and have neglected the much more important pulmonary tuberculosis. In spite of the bias under which the researches hitherto have suffered, there yet remains at our disposal a sufficient number of investigations of pulmonary tuberculosis to warrant a provisional expression of opinion.

The gist of it is—and I beg you to take note of it—that up to date in no case of pulmonary tuberculosis has the tubercle bacillus of the bovine type been definitely demonstrated. If, on further investigation, it should be established that pulmonary tuberculosis is produced by the tubercle bacillus of the human type exclusively, then the question will be decided in favor of the view which I have upheld, and we must direct our regulations for combating tuberculosis by all means primarily against the tubercle bacilli of the human type.

On account of the great importance of this question I intend to undertake as soon as feasible experiments along this line on a broad scale. At the same time I wish to make my plea to other tuberculosis workers, in order that as many cases as possible may be examined, to join with me vigorously in this task. But I wish to lay stress on the fact that the conditions laid down by me for the carrying out of these investigations must be followed. I consider it quite possible that in this manner the essential facts for deciding this important question may be collected in about two years and be presented to the next International Congress.

THE RELATION BETWEEN HUMAN AND ANIMAL TUBERCULOSIS,

WITH SPECIAL REFERENCE TO THE QUESTION OF THE TRANSFORMATION OF HUMAN AND OTHER TYPES OF THE TUBERCLE BACILLUS.

By Theobald Smith, M.D.,

George Fabyan Professor of Comparative Pathology in Harvard University Medical School.

The tendency of practical medicine to move faster in theorizing than the demonstrated facts and accumulated data of observation and experiment warrant is again manifest in the hypotheses which have recently been advocated concerning the relation existing between human and animal tuberculosis, and the portals of entry of the tubercle bacillus. Any clear insight into these problems is greatly complicated by variations in the virulence of the bacilli, on the one hand, and variations in the degree of natural and acquired immunity in the invaded host, on the other. As a result, opinions and views concerning fundamental questions differ widely. In the following pages I shall endeavor to confine myself to the experimental and other evidence bearing on the hypothesis recently put forth: that bovine tubercle bacilli may assume the human type in the human subject, and that human bacilli may become bovine in type in cattle.

A survey of the investigations thus far published reveals a practical unanimity among investigators that there exists a sharp, easily recognized difference between the type of bacilli isolated from sputum or from the lung tissue in pulmonary tuberculosis of man, and the type isolated from tuberculous cattle. The designation "human" and "bovine," which I applied tentatively to these types in 1898, has been generally accepted.[1]

The differences between these types pertain to morphological, cultural, and pathogenic characters. On serum the human type is longer and more slender than the bovine type, and slightly curved. It grows readily from the start, often profusely, and after the first generation multiplies freely on glycerin-agar and glycerin bouillon, forming on the latter a thick, nodular, or puckered membrane. The colonies on serum are in the characteristic S-shaped bundles first described by Koch. The bacilli in the bovine colonies are grouped irregularly, without any distinct conglutination, into bundles. After the bovine bacillus has vegetated for several generations on egg or

serum it will begin to grow feebly on glycerin-agar and bouillon, where it forms a very delicate membrane, suggesting tissue-paper with occasional thickenings in it.

After a fairly vigorous growth has established itself on glycerin bouillon, the bovine type presents the peculiarity of converting a bouillon containing 5 per cent. glycerin, and of a certain degree of acidity to phenolphthalein, into an alkaline medium. The human type does not do this. At the end of one to two months the bovine type is alkaline, the human type acid. The acidity of some types reaches 4 per cent. of a normal solution; that of other types, but 1.5 to 2 per cent.

It will be impossible for me in this paper to go into any details concerning this test, but I hope to present the method and its pitfalls in more detail in a future paper, and incidentally meet some of the criticisms leveled against it. All that it will be necessary for me to state here is that after a trial of seven years I find the acid or alkali production of different strains, under cultivation from one to fourteen years, constant. In all experiments in which the identity of cultures is at stake, that is, in experiments designed to test the capacity for transformation of different races by passages through animals, the reaction curve of the culture should be carefully studied beforehand as an important aid in recognizing it.

The third striking distinction between the human and the bovine type is revealed in their action upon rabbits and cattle. The bovine bacillus is highly pathogenic for these species; the human type is not. Though the bovine bacillus slowly degenerates in virulence with prolonged cultivation, yet its virulence for these species is remarkably tenacious. In 1906 a bovine culture isolated by me twelve years before, and kept growing on glycerin-agar, was still capable of killing a calf in a dose of 10 mgm. injected into a vein. Doses of 2.5 and 5 mgm. failed to do this.[2] It is well known that many strains of the human type have been used without the slightest harm upon cattle for purposes of immunization.

With these two types before me, I urged, now ten years ago, that the relationship between animal and human tuberculosis be subjected to renewed, thorough, scientific investigation. During these ten years an enormous amount of labor has been expended on this problem, and great progress has been made. The bovine type of the tubercle bacillus has been detected in man, but almost exclusively in infections pointing to the digestive tract as a portal of entry. It has been found in the tonsils, the cervical lymph-nodes, the mesenteric lymph-nodes, and in other organs in the generalized disease starting from these primary foci. It is probable that De Jong[3] and Arloing[4] isolated it from sputum. But the fact remains that bovine infections are essentially alimentary in origin and localization, and largely restricted to childhood. At the same time, the human type has been found

in the same lymph-node infections, and apparently any diagnosis as to which organism might be encountered by an examination of the lesions, during life or post mortem, is at present impossible. In three cases Kossel, Weber, and Heuss[5] found both types in the same body. In one of these the two types occurred in the same culture, and were finally separated with great difficulty. A rough and liberal estimate would make from one-fourth to half the cases of tuberculosis starting in the cervical and the mesenteric lymph-nodes bovine in origin. This achievement, to which so many have contributed, has placed our knowledge concerning the infection of man from cattle on a firm basis.

Recent years, however, have brought forth two doctrines which have tended to unsettle this dearly bought and clearly cut bacteriological victory. These doctrines are: (1) the transformation of the three types of tubercle bacilli one into the other; and (2) the more or less exclusively alimentary source of tuberculosis. This is really a necessary corollary of the doctrine of the transformability of types to account for the almost exclusive presence of the human type in pulmonary tuberculosis. This possibility has presented itself to all investigators. It was first suggested by me as worthy of careful investigation in 1898.[1]

The data upon which the doctrine of transformability is based are: (1) The reciprocal immunizing properties of bovine and human bacilli; (2) the changes undergone by bovine tubercle bacilli during cultivation; (3) the occurrence of so-called intermediate type; and (4) the results of some experiments in which certain strains passed through a series of animals have undergone modification.

The reciprocal immunizing properties of bovine and human bacilli are a strong argument for their close relationship, and not necessarily one establishing their identity. That these two types stand very near to each other cannot but force itself upon the attention of all who study them at close range. We know that they have a common toxic basis in tuberculin, and probably come from a common ancestor, but the question whether the two types have become so specialized by adaptation to different hosts as to have lost the capacity for being transformed, one into the other, is still unanswered. The real mechanism by which immunity is induced, and the components or products of the bacilli chiefly responsible for it, must first be known before we can use this phenomenon as evidence of identity.

The changes undergone by bovine tubercle bacilli after one or more years of cultivation are a slow reduction of virulence and an increased saprophytism. As a rule, cultures on glycerin-agar and bouillon cannot be distinguished by their appearance from the human type after several years of cultivation. The richness of growth in a given time is practically the same. These changes, visible to the naked eye, are not accompanied by any other marked alterations, however. The reaction curve in bouillon remains prac-

tically the same, and the rate of the loss in virulence is no greater than with human cultures. The gap between them, therefore, remains the same. Temporary modifications may also be observed. Some years ago I noticed a sudden decided change in the morphology of the bacilli and in the gross appearance of the cultures of three bovine strains in coagulated serum which accidentally contained a slowly liquefying bacillus.[6] After the cultures had been purified by a single passage through rabbits, the original characters at once returned in all three cultures. Recently, in isolating a bovine strain on Dorset's egg medium, I found one tube containing large, smooth colonies of tubercle bacilli such as I had not seen before, while the rest contained the usual very minute colonies. A microscopical examination revealed a contaminating coccus in this one tube. It has happened several times that the first transfers of human cultures, strikingly resembled the avian type of growth. In subsequent cultures this completely disappeared. On the other hand, an avian culture, originally from a pigeon, and now ten years under cultivation, can still be picked out from among twenty to thirty other stocks of mammalian cultures. These random illustrations show that bovine bacilli may undergo temporary modifications which simulate more trenchant differences. If carefully sought for, explanations are usually forthcoming. The causes being removed, the appearances characteristic of the type return. These changes I attribute to alterations in the outer membrane of the bacilli, whereby they become more sticky, and perhaps also more permeable to nutritive substances. In the case of impure cultures, the enzymes of the adventitious bacteria may accomplish this. In fact, the entire scale of degenerations witnessed during prolonged cultivation of the bovine bacillus from first to last is at present most easily explained by some kind of degeneration of the outer membrane or capsule. These changes do not necessarily have anything to do with a change in the type of the organism, although they may simulate or run parallel to the usual characters of other types.

The occurrence of so-called intermediate types is reported by many observers. Cultures of this class cannot be ranged, we are told, under the typical bovine and human types. The aberrant features pertain to either cultural or pathogenic manifestations. From the descriptions it is not always clear whether such aberrant cultures were followed long enough to determine the temporary or permanent character of the differences noted.

It is, of course, no unexpected thing to find in the same species of bacteria cultures slightly different from each other. This has occurred whenever any well-defined species of bacteria has been subjected to prolonged scrutiny. The importance or value of such differences must be carefully determined. A culture isolated by me in 1902 from a child, and pronounced bovine from its effect on rabbits and cattle, grew with great difficulty. After six and one-half years of artificial cultivation it is still easily distin-

guished from four bovine strains growing with it, by its backward growth. Even under the microscope the bacilli to-day fail to show those changes which are noticed in bovine cultures of similar age. All that we can say of this stock is that it has strongly resisted deterioration, and in this respect deserves to be regarded as a variety.

The other character on which these intermediate types are founded is higher or lesser virulence, according as we compare them with the bovine or the human type. This character taken by itself should not be regarded too seriously. That virulence should slightly fluctuate about a standard is as natural as that leaves of the same tree, or red corpuscles from the same individual, or other biological entities, can be grouped around a mean. In all cases differences should be reëxamined after a certain period of cultivation, and not at once the inference drawn that they are permanent. There are many conceivable ways in which virulence might be slightly raised or slightly lowered. Bovine bacilli vegetating for a long time in a tuberculous udder, or in tubercular bronchopneumonia, could hardly be expected to be as virulent as those discharged from a newly opened focus. Similarly, long-standing pulmonary tuberculosis with cavity formation in man might furnish bacilli of lower virulence than a fresh case, following in close succession several other cases, each derived from the preceding. We have no good reason to deny the existence of bacilli of the human type which, owing to special conditions, might, after intravenous inoculation, prove fatal to calves. This position has been assumed by Baumgarten and his pupils, and one of the latter (Tatewossianz[7]) goes so far as to maintain that there is no satisfactory proof that the bacilli from man which have been referred to the bovine type are actually of bovine origin. Some of the so-called intermediate types are said to grow more vigorously at the start than the true bovine bacillus. This may be accounted for without destroying the identity of types. The rare occurrence of strains of very low virulence which follow the reaction curve of the bovine type in glycerin bouillon is perhaps more significant, especially if this character persists after prolonged cultivation.

Some of the aberrant strains encountered in man and domestic animals may represent a degenerated bovine type; others may belong to the human type, augmented temporarily in virulence. In weighing or estimating the value of these differential characters we must distinguish between a merely transitory, temporary change and a more permanent difference; and, above all, we must keep in mind the distinction between passive degeneration in, and active adaptation to, the changed environment found in a foreign host. This passive degeneration of the bovine type which is observed regularly in artificial cultures after years, goes on, I am inclined to believe, in all hosts other than the bovine race, for none of the bovine types which I have isolated from man, horse, swine, and cats seemed to have just the maximum

virulence of bovine bacilli isolated from cattle directly. However, my observations have been too limited to be used for generalizations. Degeneration in virulence, associated perhaps with more active growth, must be regarded as a natural phenomenon affecting bacteria as well as other forms of life when taken out of their usual environment. That it may eventually lead to change of type is unproved, but not to be denied.

To what extent foreign animal hosts may modify bovine bacilli is a problem whose importance has not escaped others. The Royal Commission has promised us researches in that direction, and the investigations of Lydia Rabinowitsch[8] on birds are along this line. Indeed, much work has been done already. Perhaps the most suggestive are the results from swine. These animals are becoming more and more infected with tuberculosis, and, so far as I have been able to learn, all the cultures which have been isolated are bovine in type. The three I have studied are typically so. Although the pig may be artificially infected by feeding human bacilli, yet we have still to find a spontaneous case due to the human type. In this species, evidently no appreciable modification takes place. Among other species both bovine and human bacilli have been encountered.

In general, it may be stated that cultures from foreign hosts have not been studied with that care and circumspection demanded by the problem to be solved. The spontaneous infection of species other than man and cattle is a great experiment of nature, and this experiment should be utilized as thoroughly as possible in the future in determining what changes, if any, are caused by foreign hosts which do not, as a rule, transmit the disease to others of the same species.

The most important data for estimating the possibility of a transformation of types are furnished by the passage experiments with different species of animals. Such experiments have been reported by Nocard, Ravenel, von Behring, the writer, de Jong, Dammann and Müssemeier, the English Tuberculosis Commission, Mohler and Washburn, the German Imperial Health Office, Shattock *et al.*, and O. Bang.

Those who would to-day undertake experiments of this kind must expect a very rigid scrutiny of details surrounding such experiments. Unfortunately, many details are left to the imagination of the reviewer, for they are too numerous to be recorded.

Without going into minutiæ concerning the various passage experiments, it may be stated that they can be roughly separated into two groups: (1) Those in which cultures only were employed, and the bacilli recovered each time between two successive passages; and (2) those in which either tuberculous tissues only, or tissues alternating irregularly with cultures, were used to continue the passages.

Of the first group, the following may be mentioned: von Behring, Roemer,

and Ruppel[9] succeeded once in increasing the virulence of human bacilli by passing them through a goat. Other attempts with the same stock failed. The writer passed bovine and human cultures through a series of rabbits without any appreciable change.[10] A vigorously growing old bovine culture was isolated after six months' sojourn in a heifer without having lost any of its saprophytic vigor.[2] Kossel, Weber, and Heuss[11] passed one human culture through four goats, the same through three cattle, a second strain through five goats, and a third through three cattle without changing the characters of the type. Stanley Griffith[12] and F. Griffith, for the Royal Commission, passed bovine strains through series of chimpanzees, baboons, monkeys, dogs, guinea-pigs, and through a pig. Their conclusion is that "the bovine bacillus is very retentive of its special cultural characters and high virulence." In general, the results of these passages have been negative so far as any recognizable modification of type is concerned. When we compare these with the other group of experiments, those in which ground-up tubercular tissues were injected, we find a different outcome.

De Jong[13] inoculated a goat with a human culture. After the death of the goat, which occurred three years and one hundred and forty-five days after inoculation, he passed tissues from this case and cultures through a guinea-pig, goat, calf, guinea-pig, and calf. Another series, starting with the goat mentioned, consisted of a guinea-pig and two calves. In both series the last calf died of generalized tuberculosis within a short time.

Ravenel[14] passed a human culture through five calves, using suspensions of tissues after the first. A decided jump in virulence occurred after the first passage. Dammann and Müssemeier[15] passed a slightly virulent culture through goats with the aid of tissue suspensions, and obtained a bovine type after the fourth and fifth passages. Shattock *et al.*[16] passed sputum through pigeons without producing any noticeable changes. Passage experiments with tubercular tissues are also reported by A. Eastwood for the Royal Commission.[12] Three cultures, at first slightly virulent, became highly so; all were classed with the bovine type. Mohler and Washburn[17] increased the virulence of two human cultures by passage through cattle. The tissues used for subcutaneous injection were obtained in one case from a rabbit and a calf in succession; in the other from a rabbit, a dog, and a cat. Both these strains are reported by them as following the reaction curve of the human type in glycerin bouillon. Lastly, O. Bang,[18] by the use of cultures and tubercular tissues, claims to have converted bovine into avian bacilli by passages through fowls and rabbits.

Most of these experiments have been reviewed and criticized by others, and their vulnerable features pointed out. To analyze them in detail would be impossible, and I venture simply to state my own inferences briefly. Four interpretations may be placed upon them: (1) They may be due to the

accidental introduction of new strains during the experiment, or the use of mixed strains from the start. (2) They may be accounted for by the rehabilitation of an originally bovine culture, modified or degraded in one way or another by passages through other hosts, or saprophytic vegetation in cavities, etc. (3) They may be due to the augmentation of virulence by the peculiar methods used, without change of type. (4) They may be due to an actual conversion of human into bovine types.

The third interpretation is the one which I think meets the situation best. While some of the experiments are faulty, I think that it is improbable that in all these cases there should have been introduced adventitious strains. The increase in virulence obtained by the injection of tissue fragments is probably due to the protection afforded by the tissues to the injected bacteria. The repeated transfer of such material tends toward a selection of bacilli which become more virulent in consequence. There is no reason to deny the possibility of an increase in virulence of bacilli from one type, which are made to flourish forcibly and under unnatural conditions in animals in which such type does not occur. But the increased virulence does not mean change of type. Before we can safely accept the transformation of the bovine into the human type, or the reverse, it must be shown that the bacilli correspond in every particular to the type into which they are supposed to be converted, and they must maintain the characters of the type under prolonged cultivation. They must also produce the type of disease anatomically and histologically obtainable with the natural virus of the same age. To simply register augmentation or diminution in virulence does not prove that the type has been altered. It must also be shown that the virus obtained by passages is capable of infecting in the natural way, by feeding or inhalation, or both, for there is at present no evidence at hand that these subcutaneously or intravenously produced artificial strains can successfully compete with the natural strains, *i. e.*, enter through the usual portals in small numbers, and maintain a continued existence by producing disease.

The most recent work of O. Bang[18] has not yet been repeated by others; hence I hesitate to consider it seriously at present. Bang seems to have converted a number of strains of bovine into avian types. The ease with which this has been done should make reproduction of his actual experiments relatively simple. All of his results, however, could be explained as due to the accidental presence of the avian bacillus. The first experiment might indeed be interpreted as a case of mixed bovine and avian culture separated by means of a fowl, a rabbit, and a guinea-pig. Before accepting his conclusions, it will be necessary to repeat his experiments in a territory relatively free from the avian disease, and with all precautions against contact with pigeons, rats, mice, etc., for his work indicates that avian tuberculosis is prevalent in Denmark, and that he actually isolated an avian culture from

cattle. It will also be necessary to know how long the avian characters persist in subsequent cultures, and whether they produce the typical histological lesions of the avian disease in susceptible animals. Lastly, a strain so readily changed should be equally ready to return to its former state when passed through cattle. But, granting that there has been no admixture with avian strains occurring either in his cultures or in the fowls used by him, I believe that his results are capable of explanation on the following lines. Any modification of the outer envelop of the bovine bacillus by enzymes of the pigeon would influence both its appearance in cultures and its virulence, for it would be more easily destroyed in certain species. If, however, such modified characters persist indefinitely, either in animals or in cultures, and render the cultures indistinguishable from the avian type, we must consider the transformation a settled fact.

The time has not yet come for us to state positively that one type can or cannot be transformed into the other. The very nature of the methods employed leaves a big gate for errors to sneak in, and the proof, if it ultimately comes, will be more in the nature of a majority vote than a demonstration. In the mean time we may safely take the ground that any regular or wholesale conversion of bovine into human bacilli in the human body is out of the question, as contradicted by most of the experimental evidence thus far presented, and by certain observations made on the occurrence of the spontaneous disease. We know that human tuberculosis can exist without the aid of bovine tuberculosis, and an important aid in the final solution of this question will be the study of human tuberculosis in such regions where the bovine disease does not prevail, and where the dairy products are not shipped in from countries afflicted with the disease.

Among the first to call attention to the prevalence of the human disease in the absence of the bovine disease was Kitasato,[19] who in 1904 pointed out that human tuberculosis exists in Japan in all types, although the bovine disease does not enter as a factor. In a village in northern Sweden, Regner[20] described recently an unusual number of cases of tuberculosis, not only pulmonary, but glandular in type. Bovine tuberculosis could not be found by official veterinarians, and tuberculin gave no reaction in any of the local herds. Recently Heymann[21] has called attention to a number of places where cows' milk is either a very insignificant factor or none at all in the feeding of infants and children, and where human tuberculosis is very prevalent. I am also informed by Dr. A. B. Withington that human tuberculosis is very prevalent on the Labrador coast, but that milk and dairy products are very scarce. Perhaps more foci of this nature will be discovered in the future. A thorough study of the tubercle bacilli found in such places would throw fully as much light upon the questions before us as any number of passage experiments performed amid the dangers of outside infection.

On the other hand, there are good reasons for continuing investigations to determine whether an occasional transformation does not occur. For, basing our inferences upon the work already done, we must admit that such transformation has not yet been demonstrated, but that its possibility cannot be denied. The rare combination of conditions necessary to effect a new creation of this kind would probably make it of little practical importance. The experiments already made, which give some hope in this direction, indicate that only certain viruses, passing through certain species of animals, and in a certain definite order, might accomplish the feat. Whether any one will ever discover this hypothetical combination, and unlock the mystery of bacterial races for at least one species, must be left for the future to answer. For the practical sanitarian, I venture to predict it will continue to remain then, as now, an academic proposition.

In conclusion, I wish to suggest the following lines of research, to be carried on with the most reliable and discriminating methods devised up to the present:

1. A continued study of cases of pulmonary tuberculosis with the view of ascertaining if the bovine is exclusively responsible for any cases in which a regular discharge of tubercle bacilli takes place.

2. A further study of the transformability of tubercle bacilli by passage of tissues containing bacilli and guarded from all possible sources of error, together with a most careful examination of the nature and permanency of the changes induced.

3. A study of the varieties of tubercle bacilli among populations where dairy products coming from tuberculous cattle can be excluded as a contributory cause.

INDEX TO LITERATURE QUOTED IN THE TEXT.

1. Journal of Experimental Medicine, 1898, iii, p. 451.
2. Journal of Medical Research, 1908, xviii, p. 451.
3. De Jong: De Eenheid d. Zoogdiertuberkulose, Leyden, 1902.
4. Arloing: Lyon Medicale, 1901.
5. Tuberkulosearbeiten a. d. kaiserl. Gesundheitsamt, iii, vi.
6. Trans. Nat'l Ass'n for the Study and Prevention of Tuberculosis, 1905, i, p. 211.
7. Arbeiten a. d. Gebiet d. pathol. Anat. u. Bakteriologie, 1907, vi, p. 1.
8. Virchow's Archiv, 1907, cxc, Beiheft, p. 246.
9. Beiträge zur exper. Therapie, Heft 5.
10. Jour. Med. Research, 1905, xiii, p. 253.
11. Tuberkulosearbeiten a. d. kaiserl. Gesundheitsamt, vi, p. 77.
12. Second Interim Report of the Royal Commission of England, 1907.
13. Centralbl. f. Bakteriologie, erste Abth., Orig., 1905, xxxviii, p. 146.
14. Jour. Compar. Med. and Veter. Archives,1902.
15. Untersuchungen ü. d. Beziehungen zwischen d. Tuberkulose d. Menschen u. d. Thiere, Hannover, 1905.
16. Proc. Royal Soc. of Med., 1907, i, p. 27.
17. U. S. Dept. of Agriculture, Bureau of Animal Industry, Bulletin No. 96, 1907.
18. Centralbl. f. Bakteriologie, erste Abth., 1908, xlvi, p. 461.
19. Amer. Medicine, 1904, ix, p. 13.
20. Centralbl. f. Bakt., erste Abth., Referate, xlviii, p. 6.
21. Ztschr. f. Hygiene, 1908, lx, p. 424.

THE RELATIONS OF HUMAN AND BOVINE TUBERCULOSIS.

By Professor G. Sims Woodhead,
Cambridge, Eng.

I am very glad indeed to have the opportunity of taking part in what must be one of the most important, as it is certainly one of the most interesting, questions set down for discussion at this Congress. In any remarks I may make I should like it to be understood that, widely as we may differ from Geheimrath Koch on certain important points, the members of the British Royal Commission can in no sense of the term be spoken of as his opponents except in a purely technical sense—the sense in which I think Professor Koch must have used it. Professor Koch has placed before us a problem, and in attempting to obtain a satisfactory elucidation of this problem we are all working to one end, and in doing that are, I think, paying the greatest compliment to Professor Koch that it is possible for any body of scientific men to pay to a colleague. Speaking personally (I believe I may speak for the whole of my colleagues on this point, and I shall commit them on no others), I have the greatest admiration for the work that Professor Koch has done. I believe, indeed, that no single investigator other than Professor Koch could have enticed investigators in Great Britain to reopen this question. Withal, it must be evident that they had doubts as to the accuracy of Professor Koch's conclusions, and that in forming their own conclusions they can accept no "authority," but must rely entirely on their own experiments and observations.

As to the conditions ("requisites for conclusive work") laid down by Professor Koch,—might I say, almost unnecessarily at this stage of the work, and with the proceedings of the Royal Commission on Tuberculosis, of which I have the honor to be a member, before us,—the greatest care has been exercised to exclude possible sources of error. In this part of our work we have received every assistance from the national treasury, and our British Parliament has sanctioned the expenditure of very large sums on animals, accommodation, assistance, and the like. Through the generosity of Lord Blyth we have been able to carry on the two branches of our work (experiments with tubercle bacilli of the bovine and of the human type) at farms situated at a considerable distance (considerably over a mile) apart. At each of these is a laboratory at which the special work may be carried out, while all mate-

rial, cultures, etc., from these farms which have to be compared are examined and worked up at a laboratory situated midway between the two farms. The attendants, etc., of the one farm are never allowed to go on to the other, and direct communication between the farms is never allowed; in this way all danger of interinfection has been reduced to a minimum. In fact, it may be said to be non-existent.

As to the point raised by Professor Koch, that "the animals used for experimentation must be entirely free from spontaneous tuberculosis," we are in a specially favored and favorable position. We are fortunate in having near our shores an island—Jersey—in which spontaneous tuberculosis has never yet broken out in the herds. We have therefore been able to obtain a very large and constant supply of healthy bovines on which to carry out what I think those who have read our report will consider an extensive series of experiments—a supply such as is obtainable in no other place in the world, certainly in no other place where such investigations had been carried on. We, of course, greatly diminished the risks of accidental contamination by separating the farms and laboratories, while we have been exceedingly fortunate in obtaining the services of most competent, well-trained, and enthusiastic assistants, in whose care and ability we have seen ample reason to place the fullest confidence. Our methods and results are set forth in the appendices to our reports in the greatest detail, in order that those who may feel inclined to question our conclusions may see the data on which such conclusions are based. In this connection may I ask those who read our reports, and who have any doubt as to any details, to go to these appendices direct, and not to accept the generalizations of any one until they can form an opinion of our work?

I have already stated that in carrying on our work we have lacked neither facilities nor financial assistance, and I must ask you to accept this as evidence that neither the Commission nor the successive governments by which we have been appointed, continued, and supported, look upon this as an academic question, but rather as an intensely practical one, on which very grave issues depend—a question set before us by the greatest authority of our time. We felt, therefore, that we should leave no stone unturned to test the accuracy of statements and evidence offered by so great an authority—indeed, by two such authorities; but we were not prepared to accept anything that we could not confirm by patient and accurate investigation, especially in view of certain results obtained at a comparatively early stage of our investigations. I am glad that Professor Koch has selected the one feeding case for criticism, as it affords me an opportunity to point out that this series of experiments was one of the first we carried out. I may say that the sputa were taken with special precautions from patients in a large hospital where the milk, at any rate, is sterilized. Throughout our experiments we took

special pains to eliminate the dangers to which Professor Koch has just referred. Allowing for a moment, however, for the sake of argument, that there were flaws in this preliminary case, I should like to draw attention to the other cases bearing on the same point, to which Professor Koch has made no reference, in which, I believe, no similar weak point open to criticism will be found.

It is surely a question of more than merely academic interest that some 30 per cent. of the cases reported (not by the British Royal Commission only, but including the figures given of the German Imperial Commission) are of alimentary origin, and Dr. Cobbett, who has done such excellent work for the British Commission, working on these figures, calculates that about 7 per cent. of the cases with which we have to deal, result in all probability, from infection with tubercle bacilli of bovine origin; and surely 7 per cent., allowing a little latitude on either side of this figure for errors in statistics, observations, and calculations, can scarcely be looked upon as a negligible quantity. I may say that, bearing in mind what we now know of the curability of tuberculosis under favorable conditions, I am of opinion that this figure represents an under statement rather than an overstatement of the cases which result from infection with the bacillus tuberculosis of the bovine type.

Professor Koch states, in view of the fact that "of the human beings who succumb to tuberculosis, eleven-twelfths die of consumption, of pulmonary tuberculosis, and only one-twelfth of other forms of disease; one would have expected, therefore, that those investigators who are interested in establishing the relations between human and bovine tuberculosis would have searched for bacilli of the bovine type preferably in cases of pulmonary tuberculosis. Evidently animated by the desire to bring together as many cases as possible of bovine tuberculosis in man, they have investigated particularly cases of gland and intestinal tuberculosis, and have neglected the much more important pulmonary tuberculosis." May I point out that, so far as we were concerned, this course was adopted out of compliment to Professor Koch, and for the purpose of supplying him with material which he had been unable to find in any large proportion of cases in Germany, as we knew from previous experience that such cases might be found in considerable numbers in this country. Moreover, it was important to settle the question, Are the bacilli found in these alimentary cases virulent for bovines and rabbits? These two questions settled, and both were settled in the affirmative, it was unnecessary to continue making any special selection of such cases, for, indeed, we found that we obtained a sufficient number by taking cases as they presented themselves. As I have already stated elsewhere, we have given all our figures, and the figures relating to these are included with the others, not for the purpose of bringing "together as

many cases as possible of bovine tuberculosis in man," but of meeting prospective criticism and of giving the data on which our conclusions are based.

With regard to the question of the third group formed by the British Commission, and the question of modification of tubercle bacilli, you will readily understand that I am not in a position to say more than has already appeared in the reports of that Commission. It will be evident, however, to any one who will read the report carefully, that this is a group formed simply for the sake of convenience, because the members of which it is composed did not come under the heading of either group I or group II, and to me it does not seem to be a matter of any great importance that it should be accepted as a group. Though the group may be easily enough disposed of, the individual members of the group cannot be treated so lightly, and I feel convinced that if Geheimrath Koch will examine these members, he will not think it necessary to brush them aside as unworthy of comment or observation, but will consider them more in detail than he is at present inclined to do. They are simply spoken of as unstable from the fact that instability is a somewhat prominent character, but it must be pointed out that at the time they are separated from the animal, individual members of the group offer different degrees of virulence and different forms of growth from those met with in the two extreme types contained in groups I and II. It is not possible at present to say that these have no practical importance, and it is surely going beyond the bounds of scientific prudence to state that a bacillus introduced as a moderately virulent organism may not give rise to a more virulent progeny in the same individual, at first, perhaps, setting up a modified, but at a later stage a more active, process. As Professor Koch points out, we are not dealing with a laboratory experiment in which all the conditions are controlled, but with a case of infection, continuing how long we can scarcely say, passing through what stages we cannot determine, the results only becoming apparent when the infection has become effective in the production of a marked or diagnosable disease. I should like to point out that we have a warning illustration in what was, and is, taught as to the infectivity of tuberculosis even subsequent to the date of the discovery of the tubercle bacillus. The interval between the infection and the manifestation of the disease is so great that many observers could not bring themselves to believe that cause, as we now know it, and effect were in any way associated. The acceptance of the view of infection was delayed because of the slow growth of the tubercle bacillus and the tardy manifestation of any symptoms, and it was only when brilliant and patient men, of whom Professor Koch was chief, entered upon an investigation of the question that this point was settled. Even to-day, although the infective theory has been generally accepted, there are many who do not believe in it simply because of this long period of incubation. I do not hold a brief for the modification theory. At present I

consider that we have not sufficient information to form any definite opinion, but I think we have sufficient to warn us against throwing it aside as unworthy of consideration. Ought we not to expect, on account of this slow growth of the organism and of its slow development in the body, to find much greater difficulties in tracing any modification, either in morphological characters or in the virulence of the tubercle bacillus, than in the case of the more rapidly growing and more quickly striking disease-producing organisms? If we can find these modifications as regards form, mode of growth, degree of virulence, slight modification of function, among the more rapidly growing organisms,—such as the diphtheria bacillus, the cholera bacillus, the typhoid bacillus, the pneumococcus, and the like,—are we justified in eliminating the possibility of some similar change or changes taking place in the more slowly growing tubercle bacillus? It may be a very difficult matter to trace these changes; in fact, we should expect to find the difficulties of tracing these modifications increased in direct or greater proportion to the diminished rate of growth of this organism. May not the same conditions which regulate the modification of the more rapidly growing bacilli operate in the case of the more slowly growing tubercle bacillus? Not only must the period necessary for these modifications to come into effect be longer, but we may have to seek for fresh conditions in nature, which up to the present we have not been able to copy in our experiments and artificial infections, but which may ultimately come to be at our disposal. I certainly think that we have sufficient evidence before us to warrant us in maintaining that success, even in this direction, is not out of the question. Without going into any other points, and to bring to a conclusion my somewhat rambling remarks, let me say that of one thing I am thoroughly convinced, and that is that until a clear negative is proved, those who take the risk of giving it out that there is no danger to the community, either directly or indirectly, through an increase of tuberculosis among cattle, and that there is no danger of infection from cattle to man, especially to the human infant, incur very great responsibility indeed. As for myself, I am so satisfied with the nature of the evidence that has already been obtained, not only in England, but in Germany, in France, in Denmark, not to speak of important investigations carried on in other countries, that I am unwilling to countenance the relaxation of a single regulation for the control of bovine tuberculosis. Indeed, I will go further, and state my strong conviction that in the interests of hygiene, and with a view to the final stamping out of tuberculosis from the human race, additional and more stringent regulations will undoubtedly have to be drawn up and applied.

Dr. Leonard Pearson, President of Section VII, here took the chair.

SUR LES RAPPORTS DE LA TUBERCULOSE BOVINE ET DE LA TUBERCULOSE HUMAINE.

Par Dr. S. Arloing,
Lyon.

La question qui retient aujourd'hui l'attention du congrès a été soulevée pour la première fois par les observateurs des Etats-Unis, lorsque Theobald Smith, Gaiser, Dinwiddie, Frothingham, ont signalé des différences morphologiques et pathogéniques entre les bacilles de l'homme et ceux du boeuf.

MM. R. Koch et Schütz l'ont solutionnée en 1901, au Congrès de Londres, de manière à provoquer dans le monde des hygiénistes une émouvante surprise.

L'homme, disaient ces éminents expérimentateurs, n'a rien ou presque rien à craindre de la tuberculose du boeuf, parce que les bacilles qui sévissent sur des deux espèces sont absolument différents. Cette opinion était traduite, un peu plus tard, par M. Schütz, au milieu d'une discussion à la Société de Médecine interne de Berlin, par les termes suivants: "L'homme et le boeuf sont deux êtres différents ayant chacun sa tuberculose" dont la signification est non moins nette.

M. le Prof. Robert Koch affirme aujourd'hui qu'il n'a jamais nié la transmissibilité de la tuberculose bovine à l'homme, qu'il s'est borné à signaler la rareté de la transmission.

Assurément la pensée a été mal saisie à Londres, car si elle avait été bien comprise, on n'aurait pas vu éclore la multitude de travaux, dont quelques uns outrement couteux, qui enrichissent nos documents sur la tuberculose. Nous n'avons pas à regretter ces efforts, résultats d'un malentendu, car ils nous premettent d'asseoir nos raisonnements sur des bases scientifiques.

En insistant sur la rareté de la contamination de l'homme par la tuberculose animale, notre éminent collègue ne peut faire état que de deux facteurs:

1. Une différence profonde entre les deux bacilles;
2. Un défaut de réceptivité de l'homme pour le bacille d'origine bovine.

A l'appui d'une différence entre les deux bacilles, on a cité des particularités soi-disant, très nettes de leur pouvoir infectant, de leurs caractères morphologiques et biologiques, des caractères histologiques des lésions qu'ils produisent dans les tissus. J'ai publié aux diverses occasions, le résultat de

mes recherches, sur tous ces points, corroboré depuis par des travaux nombreux et considérables. Il suffice de la rappeler. (a) Au point de vue de l'inoculabilité, il n'y a pas de différence absolue entre le bacille humain at le bacille bovin. Tous deux peuvent infecter toutes les espèces animales par toutes les voies. Si le bacille bovin est d'ordinaire plus virulent que le bacille humain, ce dernier est parfois aussi virulent que le premier, et il existe des bacilles bovins qui ne dépassent pas la virulence moyenne du bacille humain. (b) Sur le terrain de l'anatomie pathologique, on ne relève pas non plus de différence essentielle. Comme je l'ai montré dans mes travaux avec Paviot et Thévenot au début de leur évolution, les lésions sont semblables. Quant aux lésions non folliculaires, atypiques, on les observe après l'inoculation de l'un et de l'autre bacille. (c) Que dirai-je des caractères morphologiques et biologiques des bacilles, de la forme des colonies sur milieu solide ou liquide, de la pigmentation, de la réaction prise par les milieux de culture, sur laquelle Theobald Smith a insisté récemment, de la forme et de la coloration des individus? Qu'ils ne sont pas constants, qu'ils existent à un certain moment de la vie des bacilles pour disparaitre plus tard spontanément. J'appellerai au secours de mon témoigner celui de la commission royale anglaise et celui de la commission de l'office impérial allemand.

La mutabilité s'exerce donc largement parmi les bacilles qui ont élu domicile chez l'homme et chez le boeuf. Cependant les modifications qu'ils subissent en vivant dans une espèce ne se fixent pas d'une façon définitive. Les caractères que nous attribuons à l'hôte de l'homme et du boeuf sont rarement réalisées d'une manière complète. De sorte qu'il serait bien difficile à un bactériologiste, même très expérimenté, de prétendre déterminer sûrement l'origine des bacilles d'une série qui lui serai présentée.

Je n'inclinerai donc pas à la thèse de la dualité. Et les faits apportés devant le Congrès par MM. Jancso et A. Elfer, de Kolozsvar ne modifièrent mon opinion, attendu qu'après avoir proclamé que les 123 bacilles étudiés par eux correspondent exactement aux types humain, bovin et aviaire, ils déclarent à leur conclusion 6, que les bacilles d'un groupe peuvent varier dans beaucoup de leurs caractères et dans leur virulence, et à la conclusion 8, que les bacilles retirés de différents organes du même individu montrent des variations "immenses" au point de vue de leur caractères les plus importants. Impossible d'être plus transformistes que MM. Jancso et Elfer.

En résumé, la stabilité du bacille tuberculeux serait une exception dans le monde animal. Les types admis et défendus par plusieurs observateurs ne sont que des variétés et même des variétés temporaires qui se modifient tantôt dans l'une tantôt dans l'autre de leurs propriétés sous des influences naturelles ou expérimentales. En effet ces types sont rarement réalisés d'une façon parfaite, ils se fondent dans une série presqu'indéfinie d'individus qui, par leur végétation, leur forme, leur virulence, passent graduellement de l'un à

l'autre. La variabilité suffit à expliquer les caractères habituels de la virulence des bacilles de l'homme et du boeuf.

Si nous nous mettions d'accord une bonne fois pour le proclamer, nous nous mettions en garde contre tous les bacilles tuberculeux, et nous ferions cesser les malentendus qui nous obligent à discuter ici comme nous avons déjà discuté à plusieurs reprises depuis 1901.

Voyons la dernière facteur.

L'homme manque-t-il de réceptivité pour le bacille du boeuf?

On a cité à diverses reprises de nombreuses observations d'où il résulte (autant qu'on puisse l'affirmer lorsqu'il s'agit de cas cliniques) que la tuberculose bovine s'est transmise à l'homme par inoculation et par ingestion. Il serait fastidieux de les développer devant l'assemblée. Mais j'en signalerai un nouvel exemple que je dois à l'obligeance de M. le Dr. Gaultier, chef de clinique médicale à l'hotel-dieu de Paris. Ce cas s'est produit sous les yeux du professeur Lancereaux. Il est inédit.

Un homme de 55 ans, dépourvu de tare tuberculeuse ainsi que dans ses ascendants et ses descendants, est pris d'un mal de Bright. Sur traitement médical, on ajouta le régime lacté. Retiré dans une propriété à la campagne, il fait des cures successives de lait cru. La vacherie d'où prevenait le lait renfermait 14 bêtes tuberculeuses sur 18. Elle fut renouvelée. Mais le malade, dans les derniers mois de sa vie s'amaigrit considérablement et prit dans la région cervicale des ganglions volumineux dont la nature tuberculeuse fut nettement constatée.

Le fermier à son tour succomba de la tuberculose pulmonaire.

Cet exemple est très suggestif. Je sais qu'on peut le discuter comme tous les cas cliniques. Cependant il reste et nous avons autant de droit à l'invoquer qu'en ont nos adversaires.

Je sais aussi qu'on a parlé de la bénignité des inoculations cutanées. Mais cette bénignité retrouve au même degré dans les inoculations cutanées de bacilles humains, témoins les tubercules anatomiques dont la plupart disparaissent heureusement sans entrainer de généralisation.

Nous avons lu dans le rapport de M. Kossel, au Congrès de Paris, que le bacille bovin rencontrait dans l'organisme de l'homme un si mauvais terrain que s'il parvenait à s'implanter dans l'intestin, il ne sortait pas de cet organe ou des ganglions correspondants.

A l'appui de son hypothèse, il citait le fait d'un malade frappé de tuberculose intestinale et pulmonaire et chez qui les lésions de l'intestin renfermaient le bacille du boeuf et les lésions pulmonaires le bacille humain. Ce malade avait donc été victime de deux infections différentes dans la pensée de M. Kossel: l'une intestinale, due à l'ingestion du bacille bovin, l'autre pulmonaire due à l'inhalation du bacille humain.

J'opposerai simplement à cette hypothèse un fait personnel. Le bacille

humain le plus virulent que j'ai isolé, qui ne le cédait en rien au bacille bovin le plus actif, venait de la poitrine d'un malade dépourvu de tuberculose abdominale. Je l'opposerai aussi à M. Koch affirmant que l'on n'a jamais trouvé le bacille bovin dans la tuberculose du poumon. Cela me conduit à un ordre d'arguments dont on a fait état contre nous. Je veux parler de la rareté des lésions intestinales primitives.

Vous prétendez, nous disait-on, que l'ingestion de lait bacillaire est préoccupante; mais si elle était si redoutable, la tuberculose primitive de l'intestin serait très fréquente.

Nous répondons d'abord que les lésions intestinales, d'apparence primitive ne sont pas aussi rares qu'on l'a prétendu il y a cinq à six ans. Et ensuite, nous dirons, que l'introduction du bacille de Koch par les surfaces muqueuses est bien loin d'être toujours marquée par une lésion locale.

On croyait, il y a quelque vingt ans, que la tuberculose évahissait l'organisme de proche en proche, jalonnant sa route de ganglions lymphatiques tuberculeux. J'ai montré autrefois, sur le lapin, que le virus s'étendait de la face interne de la cuisse au poumon sans léser le système lymphatique, et sur le cobaye qu'il sortait rapidement de la zone d'insertion, avant l'établissement de lésions ganglionnaires. M'appuyant sur des expériences anciennes de mon maitre Chauveau, j'ai noté l'absence d'accident à la porte d'entrée à la suite de contamination digestive.

Depuis, cette question a été réétudiée par Calmette, par mes élèves Nicolas et Descor, par Fernand Arloing et par moi-même.

Des bacilles peuvent franchir la muqueuse intestinale, circuler sûrement avec la lymphe, peut-être avec le sang, parvenir dans le coeur, et de là être lancée dans les organes d'élection où ils disparaissent où bien réussirent à créer des lésions.

J'accepte néanmoins la création de lésions intestinales primitives, mais je ne la juge pas nécessaire, contrairement à certaines assertions antérieures. En conséquence, les tuberculoses pulmonaires qui ne s'accompagnent pas de tuberculose intestinale ne sont pas obligatoirement étrangères à une contamination digestive.

Actuellement, nous ne connaissons aucun moyen de déterminer sûrement et dans tous les cas la porte d'entrée du virus tuberculeux. Nous ne pouvons émettre sur cette question que des probabilités. Et certainement beaucoup de tuberculoses pulmonaires simples ou de tuberculoses chirurgicales ont eu pour origine une contamination digestive. Le contexte serait ne tenir aucun compte des travaux des vingt dernières années. Je crois avoir répondue à l'argument tiré de la localisation intestinale.

On nous a objecté aussi la rareté des contaminations en égard au nombre de bacilles que l'homme peut ingérer et au nombre des occasions où il peut les ingérer. Heureusement, il existe entre le virus tuberculeux et celui de

maladies outrement contagieuses des différences très grandes au point de vue de la diffusibilité qui nous expliquent que la tuberculose ne se propage pas comme la variole, la scarlatine et la rougeole.

De plus, le virus passant à travers le tube digestif perd une partie de son activité au contact du suc gastrique et de son pouvoir infectieux par sa dilution dans le contenu de l'estomac et de l'intestin.

En outre, la répétition des infections, à très petites doses auxquelles l'homme est soumis, à des intervalles irréguliers, confere probablement à ce dernier une certaine résistance. On en verra la preuve dans le nombre des sujets qui, avançant en âge, acquièrent de la sensibilité aux divers moyens révélateurs de la tuberculose. Ce sont là autant de raisons qui diminuent propagation de la tuberculose, ou gênent le développement de tuberculoses très graves en dépit des causes fréquentes de contamination. Et, malgré ces influences, nous savons par les anatomo-pathologistes qui se sont consacrés à cette recherche, que bien peu d'entre nous échappent à l'infection tuberculeuse.

La question importante se pose donc de distinguer parmi les nombreuses infections dont nous portons les traces celles qui relèvent du bacille bovin.

M. Koch a indiqué, il y a quelques années un moyen de les reconnaitre. Les lésions tuberculeuse est d'origine bovine lorsqu'elle contient un bacille capable de produire une généralisation sur le veau après insertion sous la peau.

C'est à l'aide de ce critérium que la Commission de l'office impérial allemand, la Commission royale anglaise, et des expérimentateurs isolés ont tenté de déterminer la fréquence des tuberculoses d'origine bovine.

En réunissant les moyennes de divers expérimentateurs, on arrive au chiffre très respectable de 7%, si j'ai bonne mémoire.

Si l'on en croyait M. Detre, d'après la mode de détermination qu'il a communiqué hier au Congrès, ce nombre atteindrait un chiffre bien plus élevé.

Je me hâte d'ajouter que je ne veux pas endosser la résponsabilité de ces chiffres. J'ai dit que je ne jugerai pas absolu le critérium indiqué par le Prof. Robert Koch, car il existe chez le boeuf beaucoup de bacilles dont l'action se borne à une infection locale. Quant au procédé de M. Detre, très interessant d'ailleurs, il demande peut-être une confirmation expérimentale, dans tous les cas, la sanction du temps.

Donc, je ne saurais dire dans quelle mesure la tuberculose bovine participe à la tuberculisation intestinale de l'homme. Mais je ne doute pas qu'elle joue un rôle plus ou moins important. Rien dans le nouvel exposé du professeur Koch n'est capable de modifier cette opinion.

Les conséquences hygiéniques se séduisent d'elles-mêmes.

Nous devons lutter, à l'aide des moyens révèlés par la science (M. Koch

a indiqué les principaux) contre la tuberculose bovine et les dangers qu'elle nous fait courir. Il est bien entendu qu'une lutte non moins énergique doit être dirigée contre la contagion inter-humaine. Jamais personne n'a prétendu qu'il fallait la négliger. Je ne me dissimule qu'à l'heure présente la lutte contre la tuberculose bovine se heurte à des obstacles d'ordre économiques très sérieux. Mais le devoir des hygiénistes est d'expresser la vérité scientifique, et de seconder les administrateurs dans le soin et de s'y confirmer autant que possible.

Si, après avoir mené le combat contre l'infection inter-humaine, nous fermions les yeux sur le danger de la tuberculose bovine, si même nous le traitions légèrement, nous serions trop fidèlement suivis par les intéressés et nous laisserons subsister une des sources de la contagion. Nous stériliserions donc les efforts dépensés dans la lutte gigantesque contre le fléau social qu'est le tuberculose.

INVESTIGATIONS OF THE RELATIONS OF HUMAN AND BOVINE TUBERCULOSIS AND THE TUBERCLE BACILLI.

By Johannes Fibiger and C. O. Jensen,
Copenhagen.

It is common knowledge that the first important communications on differences between bovine and human tubercle bacilli are due to American investigators, and, in the front rank of these, to Theobald Smith.

As early as 1896 and 1898 Theobald Smith called attention to the differences in morphology, biology, and pathogenic power existing between tubercle bacilli isolated from man and those from cattle. These remarkable investigations attracted merited attention only after the Congress in London, 1901, where Koch based his opinion, that man is very seldom infected by cattle, mainly on experiments similar, in reality, to those of American investigators—Dinwiddie, Frothingham, and especially Theobald Smith.

Now, however, the error of Koch's opinion being generally recognized, one does not forget that the transmissibility of bovine tuberculosis to man, just as pointed out by extensive investigations of recent years, establishes the fact that tubercle bacilli from cattle often possess a very high degree of virulence upon cattle, the pathogenic power of bacilli from man frequently being considerably less.

It being quite impossible to cite more than a fraction of this gigantic experimental work, I shall only remind you of the investigations of Theobald Smith, Arloing, Kossel, Weber and Heuss, Dammann and Müssemeier, the English Commission, Behring, Ravenel, Mohler and Washburn, de Jong, etc.

All recent investigators studying tubercle bacilli from man and cattle have found differences between the bacilli from these two sources. The differences, however, are not considered in the same way.

Theobald Smith, Ravenel, the investigators of the "Kaiserliches Gesundheitsamt," and a few others have divided all mammalian bacilli into two very distinct types or groups—one human, the other bovine.

The majority of investigators, however, do not consider the differences sufficiently pronounced and stable to justify the establishment of such a

division, pointing out that cultures which can be considered as intermediate types are to be found. The demarcation between the two groups or types is not a sharp one, some of the differences being very slight (the English Commission). The tubercle bacilli from man and from cattle are varieties or races of the same species (Arloing, de Gratia, Dammann, Rabinowitsch, etc.); though varying in qualities, they are identical (Behring, de Jong).

The problem of the relations between the human and bovine tubercle bacilli is not one of biological interest only. If the differences were sufficiently distinct and stable to be used in each case as safe criteria, the way would lie open for determining the extent to which the tuberculosis in man is due to contagion from cattle, and, vice versâ, to ascertain what importance is to be attributed, in the etiology of bovine tuberculosis, to contagion from man.

In the following I shall give a summary of some investigations, made in Copenhagen in the bacteriological laboratory of the Veterinary High School and in the Institute for Pathological Anatomy of the University, by Professor C. O. Jensen and myself. The investigations comprise studies of a series of tubercle bacilli, isolated from man or from cattle, and concern the virulence of the bacilli, their morphological and biological characters, the chemical reaction of glycerin bouillon cultures, etc.

Virulence for Cattle.—Altogether we tested upon cattle the virulence of bacilli from 29 cases of tuberculosis in man. It is unnecessary to give particulars of these cases, 12 cases having been published formerly,* and the other 17 about to be reported on. For details, these papers should be consulted, as only a few points will be mentioned here.

In 14 cases we used for inoculations pure cultures of the bacilli; in 6 cases both emulsion of tuberculous material and culture; in 9 cases emulsions† only. Subcutaneous injections were made in 26 cases, intraperitoneal in 2, and in one case the inoculation was made in the pleura. Cultures being used, the injected doses of bacilli were 5 centigrams. Forty-four calves and one cow, belonging to a stock absolutely free from tuberculosis, and, with very few exceptions, tested with tuberculin, were used.

Omitting one case‡—the virulence of which could not be positively determined, the injections with material and with cultures giving different results—we can divide the other cases into two groups.

One group, which I shall call *A*, consisted of 8 cases, all containing bacilli able to produce generalized tuberculosis in cattle in the same way as the bacilli most frequently found in spontaneous tuberculosis in cattle.

In 6 of these cases the patients were children (four months to seven

* Berliner klin. Wochenschrift, 1902, 1904, 1907.
† Most frequently from man; in some cases from inoculated guinea-pigs.
‡ A child five years old suffering from primary intestinal tuberculosis.

years old). In 5 children the tuberculosis was undoubtedly primary, and in one child it was probably primary in the intestines and mesenteric glands. Information on these cases has proved that 3 children had for a long time (two and one-half months to four years) been fed partly on raw milk, produced, in one case, from a very tuberculous stock and containing a cow with tuberculosis of the udder. In a fourth case the child had been partly fed, probably for a year, on unboiled milk, only warmed up.

I do not think it necessary to dwell in further detail on these cases, all of them having been published formerly, in proof of the error of Koch's opinions, in 1901.

In the seventh and eighth cases the patients were male adults. Judging from the autopsy, it is quite probable that the seventh was also a case of primary tuberculosis of the intestines. In the eighth case, which will be mentioned later, the patient was suffering from tuberculosis of the skin, the lungs, and the urogenitalia. The tuberculosis was primary in the skin of both hands and forearms, and had been contracted by butchering cattle. The bacilli from the cutaneous infection were quite pathogenic for cattle, the bacilli from the lungs and the urine, on the contrary, possessing only an extremely low degree of virulence.

The other group, which I shall call *B*, is made up of 20 cases of different kinds. Six patients were children, 14 adults. Primary abdominal tuberculosis was found in 1 child and 3 adults; generalized tuberculosis in 2 children, one of them showing grape-like peritoneal tubercles. In one case the bacilli were found only by inoculation of a guinea-pig with an apparently quite healthy mesenteric gland of a child without any tuberculous lesions ("latent" bacilli). In one case the patient, an adult female, was suffering from tuberculous mammæ. In ten others the patients were consumptive adults whose sputum had been used for isolating the cultures. In all these cases the bacilli possessed only a very low degree of virulence upon cattle or no virulence at all.

The results thus obtained by the study of the virulence of the bacilli from these 28 cases upon cattle may be summarized as follows:

1. Bacilli of marked virulence upon cattle were found (*a*) in the skin of a butcher who had contracted a cutaneous tuberculosis by direct inoculation of bovine tuberculosis in the skin; (*b*) in some cases in which the autopsies indicated that the bacilli had been introduced through the alimentary canal, the clinical histories, however, pointing out that the tuberculosis had been contracted by ingestion of cows' milk.

2. Only in cases in which the information pointed to a contagion from man were found bacilli with a virulence no greater than the virulence of bacilli usually found in human tuberculosis.

Thus, when bacilli strongly pathogenic for cattle, according to our

investigations and those of others (Gesundheitsamt, the English Commission, Smith, Ravenel, etc.), are found in cases of the first-mentioned kind, we think the conclusion admitted that the finding of bacilli with strong virulence upon cattle in human cases of tuberculosis indicates that the tuberculosis in such cases is due to bovine infection.

We cannot, however, admit the opposite inference, that human cases with bacilli of low virulence upon cattle must necessarily be due to infection from man. First, we must not forget that a high degree of virulence upon cattle is by no means an absolutely invariable quality of bacilli isolated from bovine tuberculosis. Further, it appears from Kleine's investigations on inoculated bovine tuberculosis in butchers that bovine bacilli, though of very slight virulence upon cattle, are able to produce tuberculosis in man—a fact indicating that the bovine origin of tubercle bacilli in man cannot in every case be positively determined by inoculation in cattle.

In the case of bovine tuberculosis of the skin mentioned before, a fatal tuberculosis of the lungs and urogenitalia developed after the disease of the skin had existed for some years. As far as known, the patient had not been exposed to infection from man. At the autopsy, besides tuberculosis in the lungs and urogenitalia, an old fibrous tuberculosis with single calcareous foci was found in the axillary glands. So it seems evident that we have a new aspect of bovine tuberculosis inoculated in the skin as giving rise to secondary tuberculosis.

As mentioned before, the bacilli from the lungs and the urine possessed, however, only a quite low pathogenic power for cattle, the bacilli of the skin, on the contrary, being very virulent. We have no doubt that the advocates of a sharp division between the bovine and human types will not hesitate to suppose, in this case, two infections—one in the skin with bovine bacilli, the other in the lungs with human bacilli—the more so as the bacilli were different in other qualities also, as will be shown in the following.

Of course, it is impossible to reject such an explanation. We think, however, that it is equally probable that the bacilli, having been spread from the skin to the lungs, gradually, in these and other organs, lost their original virulence upon cattle. At any rate, taking into consideration the results of Kleine, we cannot consider the avirulence of the bacilli as disproving their bovine origin.

In our opinion, only the fact that bovine bacilli with low virulence upon cattle can be found at times both in cattle and in man makes it impossible to constitute virulence upon cattle as a sharp demarcation between a human and a bovine type of mammalian tubercle bacilli.

Virulence for Rabbits.—Altogether, we have tested upon rabbits the virulence of 22 cultures—18 isolated from man, 4 isolated from cattle. One hundred and sixteen rabbits were used, most of them having been

inoculated intravenously with 1 to 2 mgm. bacilli or subcutaneously with 5 to 10 mgm.

Two cultures, isolated from 2 cases of primary intestinal tuberculosis of children infected with milk, were found—as was the culture from the bovine tuberculosis of the skin mentioned above—to possess a very strong virulence, producing, in the same way as the 4 cultures from cattle, fatal generalized tuberculosis—when inoculated intravenously, within thirteen to twenty-seven days; when inoculated subcutaneously, within forty to sixty-eight days. These cultures were also strongly virulent upon cattle. Nine cultures, on the contrary, were found to possess a very low virulence or no virulence at all upon rabbits, and a very low virulence upon cattle.

For the part of these 12 cultures, complete accordance thus was found between the virulence upon cattle and upon rabbits. According to virulence upon both species, the 3 cultures first mentioned could easily be placed in the bovine type and the 9 last mentioned in the human.

But this was not the case with the other 4 cultures, the virulence of which could be compared upon cattle and rabbits. Altogether, 35 rabbits were used in testing the virulence of these cultures, possessing only low virulence or no virulence upon cattle. Nevertheless, of the 35 animals which were used (2 to 4 for each culture), 14 rabbits (13 inoculated intravenously, 1 subcutaneously) died within twelve to fifty-three days of tuberculosis more or less generalized, in some animals miliary tubercles in masses being found in all organs. Though possessing only very low or no virulence upon cattle, these four cultures were found to be strongly virulent in some experiments, in others only slightly virulent, upon rabbits, the virulence upon the one species thus not being always in direct proportion to the virulence upon the other.

These experiments prove sufficiently that we cannot establish a sharp division between a human and a bovine type according to virulence upon rabbits. However, it deserves notice that the investigators of "Gesundheitsamt," in their latest experiments, have found that bacilli of the human type, when injected intravenously, even in the dose used by us (1 to 2 mgm.), can also at times produce acute generalized tuberculosis. The two types not being positively separable by such inoculations, only a dose of 0.01 mgm. is to be used. We are not able to base a judgment of this statement on our own experiments; but, considering that the bacilli of the human type, when injected intravenously in a dose of 5 to 10 mgm., according to Gesundheitsamt, can also produce at times a generalized tuberculosis in calves, we feel further justified in maintaining that it is impossible to carry out a sharp division between a human and a bovine type according to virulence upon cattle and rabbits.

Examining, in addition to these investigations, the anatomical effects of

the bacilli, we found the features absolutely identical, whether the case was due to infection from cattle or from man. Neither do the histological features present any differences; and it is deserving of notice that, in a single case of primary tuberculosis of the alimentary canal, infected by cows' milk, the tuberculous tissue was everywhere found to contain an extraordinarily small number of giant-cells only, and to almost consist of epithelioid cells with bacilli in masses.

The bacilli in our cases of bovine infection in children, when observed directly in the tissue, appeared quite different, presenting, in some cases, a short and plump appearance; in others, a long and slender one.

Morphological Examinations of Bacilli Cultivated on Glycerin Bouillon.—Studying the forms of the bacilli when cultivated, we examined 15 human and 13 bovine cultures on glycerin bouillon.

Undoubtedly, as pointed out by Theobald Smith, etc., most of the cultures isolated from man contain long and slender bacilli; while the membranes in cultures isolated from cattle are most frequently composed of short, plump, straight rods. This difference, however, is not always present. Among seven cultures isolated from human sputum we have, for instance, found one containing short and plump bacilli; and two cultures from cattle contained, when twenty days old, bacilli of the type usually found in human cultures. In other cultures it was difficult or impossible to decide the type accurately, and occasionally in the same culture amassments of bacilli could be found in the same preparation, some resembling the human, others the bovine, type.

More examples could be cited, but the references given prove sufficiently that we concur fully in the opinion of the authors who assert that the morphological differences which can be observed between the bacilli from man and from cattle are too inconstant and indistinct to be used as a sharp division between two well-characterized types, and even more so for a practically differential diagnosis.

Appearance of Cultures on Glycerin Bouillon.—Studying the differences in growth described by Theobald Smith, Gesundheitsamt, and others, we have compared the cultural characters of 29 bacilli isolated from man or cattle. Glycerin bouillon was used, having been prepared and inoculated under the same conditions. The cultures were compared weekly.

Summing up our results, we may, in the first place, confirm the well-known fact that bacilli from cattle grow, as a rule, with greater difficulty than bacilli from man. But we do not approve of a sharp division into two groups only. Our cultures can be placed in the following groups:

(*a*) Cultures which rapidly produce thick, wrinkled membranes covering completely the surface and extending, at the margin, up the sides of the flask.

(*b*) Cultures producing less rapidly moderately thick, wrinkled membranes, also ascending the sides of the flask.

(*c*) Cultures growing more slowly, producing granular, wrinkled, moderately thick, less coherent membranes, not extending over the surface.

(*d*) Cultures growing slowly, producing less wrinkled or smooth membranes, often incoherent and not extending over the surface.

In group (*a*) belong:
- 4 cultures isolated from *human sputum*.
- 3 cultures from the urine, the lung, and the testicle of the patient suffering from bovine tuberculosis of the skin.
- 1 culture from cattle, long cultivated.

In group (*b*) belong:
- 4 cultures from *cattle*.
- 1 culture from the case of bovine tuberculosis of the skin.
- 1 culture from a case of bovine tuberculosis of the skin, inoculated at the autopsy of a tuberculous cow.
- 1 culture from a case of primary tuberculosis of the alimentary canal of a child infected by cows' milk.
- 1 culture from "latent" bacilli in a mesenteric gland.

In group (*c*) belong:
- 2 cultures from *cattle*.
- 1 culture from a case of tuberculous mammæ in a woman.
- 1 culture from a case of pulmonary and intestinal tuberculosis in a child.

In group (*d*) belong:
- 4 cultures from *cattle*.
- 1 culture from a case of primary intestinal tuberculosis in a child infected by cows' milk.
- 3 cultures from *human sputum*.

In group (*a*), thus, principally belong cultures which, according to origin and virulence, may be considered as human; in group (*b*), on the contrary, are bovine cultures and cultures originally of bovine source, in addition to a culture the bovine origin of which could not be proved. In the groups (*c*) and (*d*), also, are placed cultures both of human and of bovine origin. No doubt, cultural differences are thus to be found. However, they are inconstant, influenced by circumstances, and can but be used arbitrarily in separating cultures into two groups only.

Chemical Reaction of Glycerin Bouillon Cultures.—In 1905 Theobald Smith added to the differences here noted a new one, the chemical reaction of glycerin bouillon cultures, in which, according to this investigator, the reaction curve of the bovine cultures steadily moves from the acid to the feebly alkaline level, where it remains; while in the human cultures, the original acidity, after having decreased for some time, again rises, but never becoming neutral or alkaline.

We have tested 17 of the cultures mentioned before by this method, as also a series of other cultures. Ordinary bouillon, not neutralized, prepared from fresh veal with 5 per cent. glycerin added, was used in flasks in layers 2 to 3 cm. deep. While the cultures were evaporating (sixty to seventy days) the reaction was tested at regular intervals (one to two weeks),

partly in examining successively a series of flasks of the same culture, partly in drawing fluid for titration from the same flasks fitted with siphons for drawing off. In the beginning the acidity was generally 0.5; that is, 100 c.c. having been neutralized with 5 c.c. $\frac{1}{10}$ normal alkali solution, phenolphthalein being the indicator. Sometimes the acidity was 6 to 7, rarely 7.2.

We found, as did Theobald Smith, considerable differences in the reaction curves, which we shall separate into three groups:

Group A.—The bacilli produced so much alkali that the acidity of the cultures after two to three weeks was only 1 to 2. Neutral or alkaline reactions not being found can easily be explained by the fact that the original acidity used by Theobald Smith was considerably lower than in our cultures. Thus, the alkali produced by the growth of the bacilli was (in the experiments of Theobald Smith, but not in ours) able to neutralize the quantity of acid.

Group B.—Cultures in which the acidity, having been reduced during ten to fourteen days to 2 to 3, rose again within three weeks to 5 to 6.5, afterward remained essentially unaltered. As stated by Theobald Smith, this acidity is somewhat greater.

Group C.—Cultures in which the acidity rises to 9 to 10, the chemical reaction for the rest going on in the same way. In 1907 Theobald Smith described such a group, stating that the human type may be separated into two groups, one producing twice as much acid as the other.

To group *A* belong 13 cultures isolated from cattle and 9 cultures isolated from man. Of these 9 cultures, 2 were isolated from cases of undoubtedly primary bovine infection in the alimentary canal of children, 1 from the often mentioned case of bovine tuberculosis of the skin in a butcher. Of the other 6, 3 were isolated from adult patients: in two cases from sputum, in one from a case of tuberculous mammæ. Three further cultures were isolated from children: one from an apparently healthy mesenteric gland ("latent" bacilli), another from a case of generalized tuberculosis, a third from a case of primary intestinal tuberculosis. Of the 9 cultures isolated from man, the first 3 mentioned were strongly virulent upon cattle and rabbits. Of the other 6 cultures, 5 were found to possess only very low or no virulence upon cattle—2 of these cultures being also slightly virulent upon rabbits, and 3 being found in some inoculations strongly, in others only slightly, virulent upon rabbits. In the sixth culture, isolated from primary intestinal tuberculosis in a child, the virulence was also found to change in inoculations upon cattle and rabbits.

To group *B* belong 5 cultures of human origin, of which 4 were isolated from sputum of adults, and 1 from a case of pulmonary and intestinal tuberculosis in a child. All cultures were avirulent or slightly virulent upon cattle.

To group *C* belong 2 cultures isolated from the urine and from the testicle of the butcher suffering from bovine tuberculosis of the skin, one culture iso-

lated from sputum of an adult, and also a culture found strongly virulent upon cattle, which had been isolated years ago from a case of primary intestinal tuberculosis in a child.

Summing up our results, we find that they confirm the statement of Theobald Smith, that some cultures, when cultivated on glycerin bouillon, are able to decompose the glycerin into acid, but not others. We do not, however, agree with Theobald Smith in his opinion that this fact is to be used as an absolute separation between the human and bovine types.

Admitting that the cultures isolated directly from cattle, as well as single cultures undoubtedly of bovine origin, though isolated from man, have produced alkali; and, further, that the majority of cultures isolated from human sputum have produced acid—we may, however, point out that at least one culture from sputum, being, according to virulence, of the human type, has produced alkali, but not acid, just as the bovine cultures; and, inversely, that a culture strongly virulent upon cattle is to be placed among the human bacilli producing most acid.

Lastly, a series of cultures, not positively bovine in type, according to virulence, and in morphological features corresponding to the human, has been found to produce alkali. Add to this that not 2, but at least 3, types are to be separated according to the reaction curves, and that the experiments of Mohler and Washburn go to show that, in tuberculosis in wild animals, bacilli can be found which, according to reaction curves, are not to be placed in the types mentioned, the reaction of the bouillon being very slightly changed.

The English Commission, confirming the statements of Theobald Smith, interprets the differences of the reaction curves only as quantitative, dependent directly on the amount of growth. In this opinion we cannot concur; though the bacilli producing acid grow quite rapidly, cultures growing as luxuriantly are to be found among the bacilli which do not produce acid. Further, as stated by O. Bang, the avian tubercle bacilli, though they grow rapidly, do not produce acid. We consider, with Theobald Smith, the differences of the reaction curves as indicating a really different faculty of utilizing the glycerin, with or without producing acid. Accordingly, we consider the differences as a valuable disproof of the sharp division between a human and bovine type, bacilli frequently being found in man showing all the usual qualities of human bacilli, but agreeing, in this particular, with the bovine.

Faculty of Growing on Substances Free from Albumin.—In addition to the experiments here mentioned, I shall briefly outline the results of investigations made by my collaborator, Prof. C. O. Jensen, concerning the faculty of growing on substances free from albumin and peptone 36 cultures of tubercle bacilli.

Prof. Jensen employed asparagin, alanin, or ammonic phosphate dissolved (2 per cent.) in an aqueous solution of the ashes of Cibil's extract of meat, added to glycerin (3 per cent.) or glucose (3 per cent.). The cultures tested can be placed in the following groups:

(*a*) *Cultures growing on these substrates nearly as well as on glycerin bouillon.* All these cultures were isolated from man, with one exception, which was obtained from a monkey.

(*b*) *Of these cultures, being unable to grow on the substrates,* 14 were isolated from cattle and 2 from man. These 2 cultures also were of bovine origin, having been obtained from cases of primary intestinal tuberculosis in children infected by cows' milk.

One could consider this result as pleading in favor of a sharp separation of the human and bovine types; but in group (*a*) one culture, quite virulent upon cattle, is to be found.

(*c*) *Cultures certainly growing on the substrates, but very scarcely.* In this group may be placed the culture (isolated from a case of primary intestinal tuberculosis) mentioned before, the virulence of which could not be stated positively, also two cultures also mentioned before, the one isolated from bovine tuberculosis in the skin of a butcher, the other isolated from the skin of a similar patient, suffering from cutaneous tuberculosis developed from lesions received at the autopsy of a tuberculous cow.

We consider the fact that the last two cultures, though bovine, are able to grow on substrates free from albumin, as indicating that the bovine bacilli, while living in the human body, can be modified and approach the type usually found in man.

Summarizing the results of our investigations, we agree with the authors who do not admit a sharp separation between two types only of mammalian tubercle bacilli. We admit that the majority of cultures isolated from cattle possess the qualities regarded as peculiar to "typus bovinus," and also that the greater number of cultures isolated from human sputum can be placed in the "typus humanus"; but there are some cultures remaining which are to be considered as transition forms, having some qualities common to the human, others to the bovine, type.

In order to decide the question of the relations of human and bovine tuberculosis and tubercle bacilli, it is necessary to devote more study in the future than we have hitherto done to the possibility of transforming the one so-called type into the other while living in the human body or in the tissues of the domestic animals.

RELATIONS OF HUMAN AND BOVINE TUBERCULOSIS.

By Mazÿck P. Ravenel,
Madison, Wisconsin.

The practical side of this question has been emphasized this afternoon by Professor Koch and others. Certainly we all agree that this is what gives it its importance. I do not believe that any of us would have worked as hard as we have worked for this question, nor do I believe that the world in general would have taken so much interest in it, except for its practical value. On the correct solution of this question depends, no doubt, the health of many children and even their lives, and I would consider it an extreme misfortune, not only for this country, but for every country on the face of the earth, if any impression should go out from this meeting that even the small proportion of deaths due to the bovine bacillus was a negligible quantity.

Professor Koch has told us that, as far as he knows, never has the human type of bacillus been found in cattle. This, as far as we know, is the experience of us all. Of the two types, which have been so amply described this afternoon, I will not speak further.

The work of the State Live-stock Sanitary Board's report of Pennsylvania on this point at the London Congress in 1901 confirmed the experiments made previously by Dr. Theobald Smith quite fully. It is, of course, of interest to us to question how bacilli can be differentiated into two types. The explanation for this seems something like this: I assume that cattle in general have a certain resistance to tuberculosis, that resistance being greater perhaps than the resistance of animals like men. Therefore cattle are only susceptible to tubercle bacilli of high virulence. In other words, we have, so to speak, a biological filtration of the cultures by means of which the cultures of feeble virulence are destroyed by the mechanism of the animal's body, and the highly virulent type is retained. Therefore a partition is to be found which has filtered out the feebly virulent and gives us a type of higher virulence. This seems to be the best explanation I can think of for differentiating these species.

As a natural corollary of this theory it seems to me that what has been proved by the work of Jensen and Fibiger and by the work of the English

Commission is also true, namely, that this filtration is not absolutely exact. Some will retain only the most exceedingly virulent culture; others will retain a little less virulent, until we get on down to the human type. It has been demonstrated that we get all intermediate grades between the two types.

The title which has been given to me to-day has been slightly misinterpreted. What it should have been was the present status of the question as related to human and bovine tuberculosis. On account of the lateness of the hour, I will be very brief and give to you what seems to me the present state of affairs in regard to this great question.

We have proved at the laboratory of the State Live-stock Sanitary Board of Pennsylvania in the year 1901, and at the London Congress we for the first time in the world absolutely demonstrated, that the tissues of children dying of tuberculosis contained the bovine bacillus. Since that time our work has been confirmed by many men in this country, by the German Commission, by the English Royal Commission, and by Fibiger and Jensen; and, in fact, from every part of the world have come proofs of the work which we announced in the year 1902. In our own laboratory in the State Live-stock Sanitary Board of Pennsylvania this investigation has been repeated. Now the question is often brought up, "Why don't you cut it off?" It is perfectly true that if you take the whole sum and substance of the cases throughout the world, they are few as compared with the total number of deaths. That changes can take place; that we have no good method of absolutely distinguishing between the two, or at least that we cannot state absolutely the origin of any given culture that we get out, is absolutely true. In other words, this brings up the great question of the mutability—the change from the one type to the other in the human body. I believe this change can take place in culture. The tubercle bacillus is very tenacious of the type, of the characteristic. It is probably true of the body to a very great extent, although it is certainly not absolutely true. For instance, I have inoculated repeatedly bacilli of the bovine type absolutely characteristic in every respect; and if not recovered in culture, if examined in the tissue, you will find them beaded and stained exactly like human bacilli. I have also demonstrated that cows cough up sputum and distribute it exactly as human beings do, and in the sputum of such cows I have demonstrated the tubercle bacilli exactly corresponding to the human type. So I do not think that morphological differences observed in early cultures are extant in the tissues of animals.

One other thing has been proved through the work all over the world, namely, that the tubercle bacilli can pass through the intestinal wall and move through the mucous membrane of different parts of the body very rapidly without leaving any mark of their passage. Demonstrations have

shown that inside of four hours, in fact, inside of three and a half hours, tubercle bacilli have passed from the milk of animals through the thoracic duct and have reached the lungs in sufficient quantities to kill other animals inoculated. This has been carried out in a more approved way by Linevitch in Berlin, who took the extreme precaution of severing the esophagus of swine; tubercle bacilli then put into the milk of an animal, with no connection whatever between its milk and its mouth, will be found absorbed within from twenty-two to twenty-six hours.

We have given incidentally another proof along this line in some of the feeding experiments with monkeys, and we must admit that the monkey. approach man more closely than any other animal on the face of the earth, We have shown that animals which showed no intestinal lesion whatevers at least as far as we could find by microscopical examination, have diseased lungs. These specimens are familiar to many in this audience. They have been exhibited at Johns Hopkins University, before the American Medical Society and before the Academy of Medicine in New York, and before many other bodies, where the lungs of a monkey were absolutely riddled with the disease, while the intestines were absolutely free or showed the slightest lesion possible. This experiment has been shown many times. There are certain objections to them. We have taken this experiment, together with the experiment on guinea-pigs which we have made in the laboratory of the State Live-stock Sanitary Board, and the most perfect experiment which I have just quoted from Linevitch, of Berlin, as strong evidence that the tubercle bacilli go to the lungs at exactly the same rate that our food goes from the intestines through the large blood tract near the spine. It has been proved that tubercle bacilli, put into the stomachs of animals, have reached the lungs in large numbers. It has been said here to-day, and nobody has controverted it, that most of these cases occur in children. This of itself points to the intestinal tract as a gate of entry. In the proved cases cited by Dr. Fibiger, of children fed on the milk known to come from tuberculous cattle, there have been a striking number who have died from tuberculosis.

One other point has also been touched upon, namely, the action of bovine tubercle bacilli in producing cutaneous lesions. We have had the unique experience of having the assistants of the laboratory inoculated with the virus of bovine tuberculosis bacilli, and this same culture was compared with the original. We have had three infections in our laboratory, cutaneous infection by bovine tubercle bacilli, and they have acted in all respects like similar lesions in cattle. Bovine bacilli, having entered the human body, do not behave in the human body in the same way that the human bacilli do.

Let me sum up very briefly the condition of things as it appears to me

to-day. It cannot be controverted that there is a fair proportion of children and a few adults who have shown the bovine tubercle bacillus in lesions. The bovine bacillus is not infrequently found in the tonsils excised at various stages; and it is definitely proved that the tubercle bacillus will pass from the intestines into the lungs in a few hours.

Having demonstrated that there are a certain number of cases due to bovine tubercle bacillus; that a certain number of deaths occur from this bacillus; and having demonstrated that the tubercle bacillus passes into the stomach or gets there from some outside source, it behooves us, from every point of view, to take every precaution possible against contamination of our milk. I do not think it is possible, with our present knowledge, and it may be many years before we have sufficient knowledge to determine the number of cases due to the bovine bacillus as compared to those due to the human bacillus. There can be no doubt, I think, that at the present time the human phthisis is the phthisis that we must look at for the greatest number of victims. I cannot agree that the proportion of cases due to the bovine bacillus is insignificant. I emphasize the fact that, to stamp out this disease, both sides must be looked after. There is no use of keeping cats out if you are going to let the kittens get in. The kittens will grow to be cats, and therefore it is important to guard against tuberculosis in cattle, not only from the public health standpoint, but because it is a most serious economic question in almost every civilized country.

Dr. Pearson asked Prof. J. George Adami, of Montreal, to take the chair. Dr. Adami presided during the next three addresses.

THE SUSCEPTIBILITY OF CATTLE TO THE VIRUS OF SURGICAL FORMS OF HUMAN TUBERCULOSIS.

By R. R. Dinwiddie, M.D.,
Bacteriologist to the Arkansas Agricultural Experiment Station.

In the study of possible etiological relations between human and bovine tuberculosis by the experimental method, tests of the virulence of the sputum of human consumptives when inoculated into cattle, of which many have been made within the last decade, have led to fairly uniform results, establishing the fact that the sputum of human consumptives contains bacilli of lesser virulence for bovines than those derived from the tubercular lesions of cattle. Furthermore, I should say, basing the statement on my own experiments, that these bacilli of bovine origin are more virulent than those of human origin (from sputum), in a marked degree so for sheep, and also, although apparently in a lesser degree, more virulent for pigs. Rabbits also obtain a more rapidly progressive disease when inoculated with tubercular virus from the bovine. These are facts which are now well known to pathologists. I would also recall the fact that exceptional cases of human tuberculosis have been met with from which bacilli have been obtained possessing a high degree of virulence for bovines. It is now, therefore, I think, accepted by pathologists that in human tuberculosis strains or races of tubercle bacilli of varying degrees of virulence exist, so that the course of pulmonary tuberculosis or its sequelæ, slow or rapid, may be a result of either of these two factors—receptivity of the individual or virulence of the bacillus. Nevertheless, admitting this as an occasional occurrence, the fact remains that in the great majority of cases the sputum of human consumptives and cultures derived from the same do not occasion a progressive or permanent disease when inoculated into cattle subcutaneously or in the peritoneum, while bacilli of bovine origin injected by the latter method almost invariably do. In comparative tests of the effects of tubercular virus from man and from cattle on ruminants I would point out one source of error as it appears to me in arriving at a just estimate of the results. That is the premature dissection of the subject, by which we discover the immediate or proximate results of the inoculation, but lose the opportunity of studying the later or

ultimate effects. Now, the main difference, in my experience, lies in these latter. In cattle inoculated with bovine virus the lesions induced tend to be progressive and permanent, as in the natural disease, but with human, or at least sputum virus, the effects are usually temporary and tend to retrogression. The early effects may be rather severe, and occasionally even fatal, as some experimenters have found; but when survived, the lesions primarily induced undergo a healing or absorptive process and may finally be obliterated entirely.

Usually after intraperitoneal inoculation of sputum into calves a reaction to tuberculin can be obtained in a few weeks. I have seen it within three weeks. This indicates, I think, that an actual infection has taken place, with multiplication of tubercle bacilli within the body. After six months we will most commonly obtain no reaction to the tuberculin, indicating that active proliferation has ceased. Either the infection has been thrown off completely or it has become latent. I have seen instances of both of these occurrences in cattle and sheep one year after inoculation with sputum cultures—cases in which absolutely no lesions could be found, and in others a few minute calcareous foci in the mesenteric glands still containing living tubercle bacilli in small number.

I would also point out another feature which we have observed in sheep after inoculation with human sputum, and which I have referred to in previous reports. That is the occurrence of what I have called abortive miliary tubercles in the lungs. These may occur in two forms: (1) as minute, just visible, pearl-colored specks thickly distributed throughout the lungs, and consisting histologically of small round cells only, and (2) as small, round, calcareous bodies, less than a mustard-seed in size, inclosed in a thin capsule from which they are easily shelled out. In some of these latter tubercle bacilli have been found, apparently in a condition of latent life. These also were rather thickly distributed in the lung tissue of sheep and calves. Both of these lesions, evidently embolic in origin, show the slight adaptability of the tissues of ruminants to the growth of tubercle bacilli of human source. A generalization such as this of bovine tubercle bacilli would presumably have led to a fatal issue.

Morphology.—Bacilli present in the tubercular masses of cattle vary in shape. In ulcerative lung disease similar to phthisis of the human being—a condition which occasionally occurs—I have found in the few cases examined a complete similarity in shape to the bacilli of human sputum. In necrotic solid or semisolid débris of lymphatic glands in tuberculous cattle short, slender, solidly staining forms have been found which differ from the usual type of sputum bacilli both in size and in grouping, considerable numbers—20 to 50 or more—being packed together in close parallel apposition, so as to appear like almost solid masses. This, of course, is not a

common occurrence, the bacilli of bovine tuberculosis being usually present, or at least demonstrable, in relatively small number. Still, I have taken this feature—short forms and grouping referred to—as being the morphological characters to be looked for in any attempt to locate a bovine source of human infection by microscopical examination of the pathological lesions or discharges.

From this point of view, in the examination of specimens of sputum which have come to my laboratory in the past three or four years, none has been seen which possessed in any marked degree the features mentioned. Some, however, have shown slight differences from the common type of sputum bacilli, and one of these, in which there appeared to be an approach to the bovine type of morphology as assumed, was tested as to virulence by animal inoculations.

The history of this case as furnished by the attending physician was briefly as follows:

Male, aged thirty-eight, farmer; no family history of tuberculosis and no history of house infection; patient been affected for six months. Disease began as an empyema; location posterior part of left lung, followed by cough, hemoptysis, and night-sweats, which later improved. Little loss of weight and no indication of tubercular infection other than pulmonary. Has never had any enlarged or scrofulous glands.

Sputum from this case showed bacilli moderately numerous, mostly short, and arranged in groups resembling preparations from the bovine.

Inoculations.—A large guinea-pig receiving a subcutaneous inoculation of this sputum July 23, 1907, was killed after four months, and showed on dissection slight local lesions and a few small, translucent tubercles in lungs.

On the same date a calf fourteen months old received in the peritoneal cavity 5 c.c. of this sputum, now four days since collection. Following this inoculation no symptoms were exhibited and no febrile temperature at any time. The tuberculin test was applied in September, seven weeks after inoculation, and again in ten weeks, but no distinct reaction was obtained in either instance. The animal showed no effects of this inoculation during life, and on dissection one year later the only lesions found were several reddened, rough patches on omentum, and numerous very small, fibrous, tongue-like prolongations and fringes on the surface of the spleen. Caseation or tubercle bacilli not found.

These are the usual lesions in cattle resulting from sputum inoculations. The suspicion that this was a case of infection from the bovine was not confirmed by the inoculation test.

In human tuberculosis with localization other than pulmonary a possibility exists that the bacilli there represented may exhibit toward cattle a

degree of virulence different from that shown by cultures derived from sputum. The tubercular adenitis characteristic of the condition which has been designated scrofula, especially, differs in its course from other forms of tuberculosis. The slow or non-progressive course of these infections has been ascribed by writers to both deficiency in virulence and in number of the bacilli present. One writer* advanced the interesting theory that scrofula is the manifestation of the bovine disease in man.

From human tuberculosis other than pulmonary the following inoculation tests have been made as occasion offered during the last few years.

Tubercular Arthritis.—The material consisted of purulent fluid from the knee-joint of a youth, the seat of disease for over a year, the bones of the joint being enlarged and spongy. Tubercle bacilli rare; usual morphology.

June 14, 1904: Guinea-pig (weighing 682 gm.) inoculated subcutaneously with one drop of this material. It was killed for dissection October 3d (weight, 658 gm., and in fair condition). The liver contained many hard, white nodules from size of rape-seed to that of a pea, with thick, purulent center, while the spleen and lungs showed a number of gray, translucent tubercles.

Cultures on serum were obtained from the spleen. From the purulent nodules in the liver, in which tubercle bacilli were sparsely distributed, inoculations were made to a guinea-pig, a rabbit, and a Belgian hare.

The guinea-pig died from some extraneous cause three weeks later.

The rabbit (weighing 1435 gm.) was inoculated in peritoneum. At the end of a year following the inoculation it was still alive and apparently well, but died three weeks later. Dissection showed local tubercular lymph-glands and a caseous nodule in the liver; other organs normal.

The Belgian hare was also inoculated in the peritoneal cavity. It remained in apparent health for four months. Its death, which occurred at that time, was not attributed to tuberculosis, since no lesions were found except two pinhead-sized, yellow, calcareous nodules in the liver in which tubercle bacilli could not be found. Evidently the Belgian hare is as little susceptible to human tubercular virus as the rabbit.

Inoculations of cultures obtained from the first guinea-pig were made to cattle, sheep, and pigs, one of each, the injection in each case being made into the peritoneal cavity. A guinea-pig weighing 806 gm. was also inoculated subcutaneously with a small dose. It died in fifteen weeks with extensive tubercular disease in liver, spleen, and lung, indicating a culture of the usual degree of virulence for this species.

January 3, 1905: Inoculations made from the second transfer on glycerin-beef serum; a large, typical growth (typical of sputum cultures) seventeen

* Creighton: Jour. Anat. and Physiol., 1880, 1881, p. 1.

days old. A pinhead-sized piece broken up in sterile water was injected into the peritoneal cavity of each animal—calf, sheep, and hog.

The calf (about nine months old) gave a doubtful reaction to tuberculin after two months, and again in the fourth month the reaction was uncertain (highest temperature, 103.6° F.). Killed for dissection on July 12th, that is, six months after inoculation, it showed the following changes: Omentum shows rough red patches of short and longer fringes; two flat, pendant nodules 1 cm. in diameter and yellow at margin on the surface of the rumen. Fringes over a hand's-breadth on surface of one lung and adjacent costal pleura. Very slight fringe formation on surface of spleen. No involvement of lymph-glands nor other changes found except those mentioned.

A spring lamb, probably about ten months old, similarly inoculated, was killed in four months, when obviously in a dying condition. Up till the last week it was apparently in good health. Dissection showed on the omentum, on the spleen capsule, and on the serosa of the gut a moderately numerous distribution of yellow, calcareous nodules the size of a pinhead or less. The animal was enormously infested with œsophagostoma nodules in the wall of the intestine, and even in the mesenteric glands, but some of these glands were apparently also tubercular. No other tubercular lesions were found, and the cause of death remained uncertain. Nodules of the serosa showed tubercle bacilli in groups and mostly short forms.

In the hog, also killed at the end of six months, when apparently in health, a few small rough areas and three or four seed-like nodules were found on omentum. Surface of spleen roughened by fringes all over the capsule. These are quite small and do not show tubercles. All the other organs, including lymph-glands, are unaffected. The disease seems to have been local. The roughened patches on omentum, when examined by the lens, show minute yellow tubercles. These are seed-like and are cysts containing each a calcareous particle. Tubercle bacilli, both long and short forms, are readily demonstrated.

The conclusion to be derived from this experiment is that the bacilli present in this case of tubercular arthritis correspond in their effects upon animals with those usually present in the sputum of pulmonary tuberculosis. There is no evidence of a bovine origin here.

After this rather lengthy record the remaining tests can be given briefly.

Genito-urinary Tuberculosis.—One case in which tubercle bacilli of usual form were present in large number in the urine of an adult. Tested on the guinea-pig and rabbit (directly, without cultures), the results were such as we obtain from sputum—extensive generalized disease in the former, slight and mainly local lesions in the latter.

Tubercular Glands of Neck.—In two cases inoculations were made directly from the caseous material into the peritoneal cavity of calves. In one

sample tubercle bacilli were found in very small number; in the other, they could not be demonstrated by the microscope, but the case proved tubercular by infection of the guinea-pig. Neither of these cattle reacted to the tuberculin test, and remained in apparent health till dissected, eight months later. At the autopsy no lesions of any kind were found. As to the virulence of the bacilli present, a guinea-pig weighing 400 gm., inoculated from one specimen, when killed four months later showed no loss of weight. The tubercular changes consisted of several enlarged, hard, caseous lymph-nodes at site of inoculation and one beneath the spine in the lumbar region. In the lung there were a few translucent spots, hardly recognizable as tubercles; other organs normal. In the local lymph-nodes tubercle bacilli were present, though not numerous; short forms predominating. Either from deficient number or feeble virulence, the effect on this animal was but slight.

From the local caseous glands of this guinea-pig a second weighing 614 gm. was inoculated subcutaneously. It died in a condition of emaciation at the end of six months, showing generalized tuberculosis with yellow nodules crowded in spleen, liver, and lung.

The results of these inoculations from scrofulous glands, on account of the scarcity of the contained bacilli, can hardly be considered conclusive as to their effects on cattle. I publish them rather to arouse interest in this matter in others who may be more favorably situated for making such experiments. So far as they go, they furnish no indication that scrofulous glands are of bovine origin, but they require repetition with cultures, by which larger doses may be injected.

The object in view in making such experiments is, of course, to throw some light on the mooted question of human infection from the bovine. With all that has been written on this subject during the last decade I contend, and I think many will agree with me, that the question is still in the speculative stage.

TUBERCULOUS CERVICAL ADENITIS.

A STUDY OF THE TUBERCLE BACILLI CULTIVATED FROM FIFTEEN CONSECUTIVE CASES.

By Paul A. Lewis, M.D.,
From the Laboratory of Comparative Pathology, Harvard Medical School.

The study I wish to report on here in a preliminary way was begun on the first of February, 1907. It was thought at that time by Dr. Theobald Smith that there was adequate recognition, among workers in this special field, of the definite distinction between tubercle bacilli of the human and bovine type, and of the proposition that the bacilli cultivated from a certain small number of cases of human tuberculosis were typically bovine in character; that presumably the human being had become infected from the bovine in these cases and in no others. In the work done up to that time effort had been directed toward the discovery of instances of this type of infection. It had been shown that these relatively rare cases were never cases of chronic pulmonary tuberculosis; that they were most usually cases of infection by way of the intestinal tract in children, particularly cases of mesenteric lymph-node diseases. Several cultivations from the cervical lymph-nodes had likewise given bacilli of bovine type.

It was felt that the time had come when it was possible and advisable to attempt to get definite statistical evidence as to the frequency of the infection of human beings with the bovine type of tubercle bacillus, that the technic had been developed to such a point that the work was feasible, and that the most profitable point of immediate attack would be in the field of cervical lymphatic gland infection—an important, rather frequent disease in any community, one which had been little studied from this point of view, and a field in which a certain percentage of bovine infections might confidently be expected to occur.

Accordingly, at the suggestion of Dr. Smith, and under his immediate supervision, I undertook to study a consecutive series of cases of tuberculous cervical adenitis, with the aim of determining the type of bacillus active in

each case. My sincere thanks are offered to Professor Smith for the initial suggestion and for the unceasing advice and attention which have made it possible for me, a beginner in this difficult work, to arrive in relatively short time at a classification of the cultures from a considerable number of cases.

Literature.—Most of my audience are doubtless familiar with the literature of this subject, and my review may properly be very brief.

In the general series of cases from the German Imperial Health Office there are reported four cases of primary cervical adenitis, two of which were due to bacilli of bovine type.

Smith has described three cultures of bovine type isolated from tonsils in cases in which the cervical lymph-nodes were probably also infected. The report of the English Commission shows that nine of their cultures were derived from cervical glands. Three of them were of bovine type.

Recently Oehlecker, of the German Imperial Health Office, has reported on isolations from fourteen consecutive cases of primary cervical adenitis. Two were in adults, both infections being of human type. Twelve cases in children yielded four cultures of the bovine type.

Certain other cases of isolation from cervical glands in cases of generalized fatal tuberculosis have been reported whose bearing on this question is not clear.

With the exception of the work of Oehlecker, the results so far reported have been too fragmentary to be worked into satisfactory statistical evidence, but it would seem probable from his results, taken with the instances reported by others, that about one-third of the cases of primary cervical adenitis are due to bacilli of bovine type.

Methods.—The material for this study has come to my hand without selection, through the kindness of the staff and house physicians of the Children's Hospital, Boston, and the Boston City Hospital. It has been material removed at operation without exception. I have received it in moist gauze from the operating room, as a rule. But in no case have I been able to control its manipulation absolutely, and I am obliged to assume as a probability that there has been no contamination with other tuberculous material before it reached my hands.

As soon as possible after receiving the material, guinea-pigs were inoculated with it. After three to five weeks cultures were made from the guinea-pig. First cultures were always made on Dorset's egg medium, and these were uniformly successful; in each case in which the guinea-pigs became tuberculous I have obtained cultures on the egg medium. Subsequently transfers have been made, at intervals of three to six weeks, to parallel series of egg medium and glycerin-agar. After the glycerin-agar culture has become thoroughly established in any case, I have discontinued the series on the egg medium. The glycerin-agar culture, whenever it has been possible

to obtain it, has been as the stock culture, subsequent transfers and most inoculations having been made from this medium. In two instances, however, the egg medium is still in use. After over a year of cultivation no glycerin-agar cultures have been obtained. Dog serum has not been used routinely because of a local difficulty in obtaining a regular supply.

After an active growth has been established with any culture it has been tested as to its growth on glycerin bouillon and the changes in reaction which it might bring about. The virulence for rabbits has been determined. Three of the cultures have also been tested as to their virulence for calves; in the other cases it has been assumed that the virulence for rabbits was a satisfactory indication of the virulence for cattle.

General Summary of Results.—I have thus examined 17 cases of cervical adenitis. In two cases the guinea-pigs failed to develop tuberculosis, although microscopical examination of the tissues showed the pathological picture of tuberculosis, in one case most typically. The fifteen cases in which tuberculosis developed in the guinea-pig all gave positive cultures.

The virulence of these cultures for rabbits has been determined, with the following results:

Each culture was inoculated intravenously into a rabbit in dose of 0.5 c.c. of a standard suspension, corresponding roughly to 0.5 mgm. of culture. Nine cultures killed in from two to three weeks with generalized tuberculosis. Six cultures did not kill. The animals ultimately gained in weight, were killed after two to four months, and showed a small to moderate grade of localized chronic tuberculosis. Several of the nine cultures which killed were retested in the same dose to exclude the possibility of accidental, coincidental disease. The result was as before. Finally, each of the nine virulent cultures was inoculated intravenously in $\frac{1}{100}$ of the standard dose, corresponding to $\frac{1}{200}$ mg. of culture. This dose killed in several instances in less than twenty-five days; eight of the animals were dead by the fortieth day. The ninth rabbit survived three months. It was at that time failing rapidly, was killed, and found to have an active generalized progressive tuberculosis.

Nine of the fifteen cultures are then found to be virulent for rabbits. It has been abundantly shown that it is safe to assume a corresponding virulence for cattle. However, three of these cultures which attracted our attention by reason of apparent cultural peculiarities were tested on calves. Three calves were inoculated intravenously with 5 mgm. of these three cultures respectively. All died in less than three weeks. One calf was inoculated in each case with 5 cg. of culture subcutaneously. These experiments are unfinished, but the animals seem certainly to be suffering from generalized tuberculosis at present, six weeks after inoculation.

To compare these virulence tests with cultural characters: The six

cultures which failed to kill rabbits were in each instance transferred at the first subculture to glycerin-agar, and grew from the beginning on this medium luxuriantly. They were as easily transferred to glycerin bouillon, growing for the most part with a heavy membrane which spread slowly and thickened markedly as rapidly as it spread. Titrations according to the method of Theobald Smith with 5 per cent. glycerin bouillon show that five of these six cultures produce a highly acid reaction at the end. The sixth culture has given an alkaline end-reaction up to the present time, and apparently corresponds to a culture isolated by Dr. Ravenel some years ago.

The nine cultures virulent for rabbits have shown a very variable adaptability to culture-medium. Subcultured each month to six weeks, I give the number of the subculture at which they have attained practically the luxuriance of growth of the non-virulent cultures as an index of their adaptability. Four cultures grew at once on glycerin-agar, and at the third subculture were as vigorous as the others. Three cultures failed to grow on the first glycerin-agar transfer and required from five to eight subcultures to reach maximum vigor. Two cultures, one eighteen months old, the other a year old, in spite of repeated trials, still refuse to grow on glycerin-agar. The more recent of these promises soon to give growth; the older so far shows no evidence of adaptation.

The growth on glycerin-agar has been a fair index of the possibility of obtaining growth on glycerin bouillon. It will be understood on this account that there has so far been no possibility of satisfactorily determining the reaction curve of all of these cultures. I have, however, encountered no convincing exception to the rule laid down by Theobald Smith, that the virulent cultures approach the neutral point as the end-reaction after forty to sixty days.

It seems safe at this time to say that the nine cultures of lesser adaptability and high virulence are of bovine type; the six cultures which readily adapt themselves to glycerin-agar and which have low virulence for rabbits are of human type. The interesting question may be raised as to whether the one avirulent culture which is marked off from its fellows by a failure to produce acid is not a bovine type modified as to its virulence and adaptability.

A careful study of such clinical and pathological data as I have been able to gather in connection with these cases has shown no feature of distinction in regard to pathological picture, number of bacilli present, duration of disease, family history, previous history, or present condition of the patients. There is, however, a striking difference in the average age of the patients. The average age of eight of the patients giving bovine type of bacillus was eight and a half years. The youngest was eighteen months and the oldest

nineteen years. The average age of the six patients suffering from infection with the human type of bacillus was seventeen and two-thirds years, the oldest thirty-two years, the youngest eight years. Of the cases of cervical gland disease in persons over fifteen years of age, four-fifths are infections with human type. Of the cases in persons below fifteen years of age, seven-ninths are of bovine type. The bovine type of infection would seem to be more common in children, the human in young adults, although the limitation is not an absolute one.

In closing, it is perhaps not out of place to express the hope that the work so far accomplished in this direction, taken with the detailed work of a consecutive character which the future may bring forth, may render it possible to replace by statistical data the somewhat contradictory current opinions as to the transmissibility of bovine tuberculosis to man.

THE TYPES OF TUBERCLE BACILLI PRESENT IN EIGHTY-FOUR CASES OF HUMAN TUBERCULOSIS IN NEW YORK CITY.

By William H. Park,

Director of the Research Laboratories of the Department of Health.

This is a preliminary report of an investigation carried out in the Research Laboratory of the Department of Health of New York City by four investigators working under my direction, namely, Dr. Chas. Krumweide, Dr. Wm. H. Woglom, Dr. Frederick Montgomery, and Dr. Elise L'Esprance.*

These investigations are to be continued until about four hundred cases of pulmonary tuberculosis in adults and one hundred cases of other forms of tuberculosis in children have been examined.

In all the cultures from these cases the character of growth upon egg and glycerin-egg media, and the virulence of carefully weighed amounts in rabbits, have been determined. It is thought that, although the culture tests are limited, they are, nevertheless, sufficient to indicate correctly the type of the bacilli, and thus add to the general information being collected from various sources. The methods adopted and the results obtained are summarized in the following pages.

Methods of Isolation.—No direct cultures were attempted. All material was injected into guinea-pigs which were allowed to live from three to five weeks. At the end of this period the tubercular organs were removed and thoroughly minced with knife and forceps. This minced tissue was then smeared over the surface of the culture-tube. This mincing and rubbing of the material over the culture-media we have found preferable to simply cutting the tissue, laying on the surface of the media, and subsequently

* The salaries of these investigators were paid from an appropriation made by the city for the study of respiratory diseases. This was obtained through the efforts of Dr. H. M. Biggs, Medical Officer. There has already been published an investigation upon acute pneumonia and upon pneumococci. This investigation was undertaken with the approval of Dr. Biggs and other New York city members of the commission appointed to study respiratory diseases.

moving to spread the growth, as advised by Theobald Smith. The second opening of the tube, a fruitful source of contamination with molds, is avoided, and the final growth is equal and greater in amount.

Methods of Cultivation.—Egg media of two types have been used for isolation and further cultivation. The ease and simplicity of preparation and the uniformity of the final product make other media for isolation superfluous.

The egg media were made as follows: Plain egg (Dorset): the whole egg was mixed with 10 per cent. by weight of water, inspissated at 70° C. for two hours, and a few drops of sterile water added to each tube to provide the necessary moisture. Glycerin egg (Lubenau) consisted of ten eggs mixed with 200 c.c. of 5 per cent. glycerin bouillon, 1.5 per cent. acid to phenolphthalein.

Other media, as glycerin-agar, glycerin bouillon, and glycerin-potato, were also used to determine the cultural characteristics and for further cultivation. The glycerin-potato has been the most uniformly successful as a stock medium for further cultivation. The cotton stoppers in each case, with or without dipping in paraffin, were pushed down the tube, which was then closed with a tight-fitting charred cork and incubated in the inclined position.

All cultures so far isolated have fallen into two distinct groups—eugonic (luxuriant) and dysgonic (sparse). This difference is noticed on plain egg, but to a less marked degree than on glycerin-egg. Here the influence of glycerin on the growth of the two types, as noticed by several investigators and carefully elaborated by Cobbett, causes a wide gap in the amount and rapidity of growth of the two types. The disgonic type commonly fails to grow in glycerin-egg from animal tissue, and if transplanted from plain egg after the first or second generation, grows but sparsely. The growth consists of thin, flat, spreading colonies, 1 to 2 mm. in diameter, or a confluent, thin, flat, slightly granular, non-pigmented layer, which is usually moist. The eugonic type, on the other hand, grows luxuriantly in most instances on glycerin-egg, directly from the animal tissue, and in every case in the second or third generation. The growth is confluent, raised, crumpled, or coarsely verrucose, dry, and in practically every case shows a pink pigmentation in some generations. The pink color depends on certain unknown differences in the different batches of media.

The other media used, as glycerin-agar, potato, and bouillon, we have found mainly of value as corroboration of the above differences, for the following reason: The eugonic strains grow luxuriantly upon these media, usually in the second generation, and always in the third or fourth. The dysgonic strains, on the other hand, usually fail to grow in the early generations; or if they do, the growth is very slight.

The differences in the growth of the two types as given only apply to the first few generations, and to cultures which are three weeks old, the rapidity of growth as well as the amount being an important factor. In later generations and with longer periods of incubation the differences are not so marked. We have not had the strains in cultivation long enough to be able to say if this difference will eventually disappear.

This division into dysgonic and eugonic viruses has been found in every case to correspond with the differences in virulence in rabbits.

Rabbit Virulence.—In the following description of this branch of the work the term "virulent" is applied to such viruses as are able, after intravenous inoculation in amounts of 0.01 mg., to induce a generalized progressive tuberculosis, terminating in the death of the rabbit within a period of six weeks.

The bacilli are removed from the surface of a subculture which is less than one month old, and the excess of moisture removed by gentle pressure between sterile filter-papers before the mass is weighed. The culture-medium used for these subcultures has been glycerin-egg and there have been added to the tubes, after coagulation of the medium, a few drops of glycerin bouillon. The growth immediately above the fluid can be readily and perfectly emulsified. After weighing, the bacterial mass is emulsified in physiological salt solution, which is added in such amount that 1 c.c. of emulsion represents 1 mgm. of organisms. The dysgonic viruses afforded too little growth for weighing. An emulsion was therefore made and compared with a known emulsion from a eugonic virus, the comparison consisting in the equal ease with which print could be read through each emulsion. Where a dose of 0.01 mgm. is desired, the original emulsion is diluted. The amount of fluid inoculated is always 1 c.c. The intravenous route was decided upon as the most suitable for our purpose, and it has been adhered to throughout the experiment.

It soon became evident that we had to deal with two, and only two, varieties of organisms, one of which far exceeds its fellow in virulence. In no case have we observed the slightest deviation from this condition; we have seen, that is, no strains of intermediate virulence for rabbits. Nor have we yet seen an exception to the rule that viruses whose growth is dysgonic on glycerin-egg are virulent for rabbits, while all the other strains are almost, if not quite, non-virulent.

An animal inoculated intravenously with 1 mgm. or with 0.01 mgm. of bacilli of the bovine type soon becomes emaciated, the fur loses its luster, respiration becomes labored, and death occurs in from nineteen to forty-two days, with an average period of twenty-eight days. Autopsy reveals extreme emaciation and a generalized tuberculosis involving almost every structure in the body. The lesions in the lymph-nodes, and of these particularly the inguinal

and the axillary, are characteristic. The nodes are enlarged, congested, and studded with minute caseous areas. The spleen is always three or four times its normal size and riddled with tubercles, and the kidneys are sure to contain on their surfaces an average of from six to ten tubercles each. The liver, on the contrary, rarely contains demonstrable microscopical tubercles. The lymph-nodes of the abdomen are usually enlarged, as are those of the thorax, but they do not, as a rule, present the characteristic lesions of the superficial group. The lungs are always entirely consolidated, and are literally a mass of tubercles. Tubercles in the heart muscle are not infrequent. The extent of the lesions and the duration of the illness seem to be rather a matter of individual resistance than of dosage. Thus, it is no uncommon occurrence for the rabbit which received 0.01 mg. to die several days before the one which, at the same time, had been given 1 mgm. of the same virus. Nor does it seem that old rabbits are more resistant than young ones.

Separated from such viruses by a wide interval of virulence are the eugonic viruses. These never cause generalized progressive lesions in doses of 1 mgm., and a rabbit so inoculated will live until carried off by an intercurrent malady. The appearance at autopsy is in striking contrast to the findings described in the preceding paragraph. The animal will be found well provided with subcutaneous and abdominal fat, and the lymph-nodes are normal in size and appearance. The appearance of the lungs varies with the length of time that has elapsed since inoculation. About six weeks after injection they are pretty extensively involved, for at this point, of course, many of the inoculated organisms are arrested. But that the lesions under discussion are regressive is shown by the fact that the animal has gained weight, as well as by our observation that in rabbits autopsied after an interval of three or four months the lungs are pink, well collapsed, and with tubercles only sparingly distributed throughout them. Almost always there are a few tubercles in the kidneys. The spleen is invariably of normal size and occasionally a tubercle may be found on its surface. Tubercles in the heart muscle are quite uniformly absent. Rarely, after a long interval, there occurs a tubercular orchitis. In rabbits which have, some time after inoculation, lost weight and eventually died, there has always been an adequate cause for death, other than tuberculosis. This, in most of our rabbits, has been either coccidiosis or septicemia.

The following tables show the material investigated and the type of organism isolated. The viruses are said to be of the human type when they are eugonic and non-virulent for rabbits; of the bovine type, when the reverse is true.

PULMONARY TUBERCULOSIS, ADULTS.

Name.	Age.	Number and Source of Culture.	Type.
A. K	17 yrs.	No. 5, Sputum.	Human.
J. W.	22 "	" 9, "	"
M. S.	Adult.	" 10, "	"
M. S.	16 yrs.	" 11, "	"
R. R.	Adult.	" 13, "	"
M. V.	24 yrs.	" 22, "	"
W. E.	Adult.	" 26, "	"
A. M.	38 yrs.	" 27, "	"
C. K.	Adult.	" 32, "	"
H. W.	Adult.	" 34, "	"
A. M.	30 yrs.	" 35, "	"
A. S.	Adult.	" 36, "	"
B. P.	Adult.	" 38, "	"
J. H.	24 yrs.	" 39, "	"
J. W.	Adult.	" 42, "	"
E. K.	39 yrs.	" 44, "	"
L. T.	40 "	" 46, "	"
M. F.	Adult.	" 47, "	"
W. B.	29 yrs.	" 48, "	"
J. G.	30 "	" 51, "	"
	Adult.	" 59, "	"
D. D.	45 yrs.	" 60, "	"
T. W.	20 "	" 64, Tonsils and adenoids; 125,* Sputum	"
S. T.	19 "	" 75, Sputum.	"
A. D.	21 "	" 76, "	"
M. S.	18 "	" 77, "	"
C. H.	36 "	" 81, "	"
E. B.	29 "	" 82, "	"
C. B.	34 "	" 85, "	"
M. L.	30 "	" 86, "	"
M. Y.	28 "	" 87, "	"
H. S.	29 "	" 88, "	"
A. F.	58 "	" 90, "	"
A. N.	Adult.	" 92, "	"
H. H.	20 yrs.	" 101, "	"
M. G.	29 "	" 102, "	"
H. C.	25 "	" 103, "	"
M. M.	23 "	" 105, "	"
L. C.	24 "	" 106, "	"
P. Z	22 "	" 108, "	"
S. J.	23 yrs.	" 112, "	"
M. R.	17 "	" 117, "	"
R. R.	33 "	" 119, "	"
J. W.	22 "	" 126, "	"
I. W.	42 "	" 128, "	"
J. D.	18 "	" 133, "	"
R. H.	27 "	" 134, "	"
F. O.	18 "	" 136, "	"
P. McC.	23 "	" 219, "	"
J. C.	27 "	" 220, "	"
A. H.	38 "	" 221, "	"
R. L.	30 "	" 222, "	"
J. K.	29 "	" 240, "	"
L. E.	26 "	" 252, "	"
J. C.	39 "	" 253, "	"

Total cases ..... 55 { Bovine type 0
Human type 55

* Not finished in rabbits, but culturally human type.

PULMONARY TUBERCULOSIS, INFANTS.

NAME.	AGE.	NUMBER AND SOURCE OF CULTURE.	TYPE.
E. B.	11 mos.	No. 15, Sputum.	Human.

Note: For other cultures from pulmonary lesions see under Generalized Tuberculosis.

TUBERCULAR ADENITIS.

NAME.	AGE.	NUMBER AND SOURCE OF CULTURE.	TYPE.
F. F.	14 yrs.	No. 7, Cervical nodes.	Human.
C. S.	4½ "	" 28, " "	"
L. D.	12 "	" 29, " "	"
S. H.	20 "	" 31, " "	"
E. H.	6 "	" 67, " "	"
H. B.	8 "	" 94, " "	"
M. Z.	9 "	" 95, " "	"
Baby	21 mos.	" 96, " "	Bovine.
C. F.	2 yrs.	" 116, " "	Human.
J. C.	10 "	" 150, " "	"
M. L.	6 "	" 155, " "	"
M. McC.	10 "	" 201 and (162 *) " " both sides.	"
L. S.	4½ "	" 167, " "	"
G. T.	12 "	" 205, " "	"
A. A.	4 "	" 217, " "	Bovine.
C. L.	15½ "	" 247, " "	"

Total cases ..... 16 { Bovine type ..... 3 / Human type 13

Note: The percentage of bovine types will be much higher, probably about 30 per cent., when the viruses at present in cultivation have been tested in rabbits, as many of our later cases are culturally of the bovine type.

* Not finished in rabbits, but culturally human type.

GENERALIZED TUBERCULOSIS, INFANTS.

NAME.	AGE.	NUMBER AND SOURCE OF CULTURE.	TYPE.
A. R.	2¼ mos.	No. 1, Sputum; No. 45, Feces.	Human.
J. C.	1⅓ yrs.	No. 16, Mesenteric nodes; 19, Spleen; 20, Bronchial node.	"
J. C.	5 mos.	No. 58A, Sputum; 58B, Cerebrospinal fluid.	"
M. B.	3½ "	No. 62, Mesenteric node.	Bovine.
E. H.	1¼ yrs.	No. 63,* Lung; No. 69, Mesenteric node.	"
M. I.	2⅔ "	No. 66, Bronchial nodes.	"
W. G.	7½ mos.	No. 71, Bronchial nodes.	Human.
M. McD.	6 "	No. 97, Liver; No. 98, Lung; No. 99, Spleen	"
	6 "	No. 100, Mesenteric nodes.	"
F. A.	3⅚ yrs.	No. 122, Mesenteric nodes; No. 123,* Lung.	Bovine.
J. Van H.	1½ "	No. 148, Cerebrospinal fluid.	Human.
I. B.	5½ "	No. 164, Lung; No. 165, Bronchial nodes.	"

Total cases ..... 11 { Bovine type ..... 4 / Human type 7

* Not finished in rabbits, but culturally bovine type.

TUBERCULAR MENINGITIS, INFANTS.

Name.	Age.	Number and Source of Culture.	Type.
M. L.....	5 mos.	No. 2, Sputum; No. 4, Cerebrospinal fluid.	Human.
M. S.....	10 "	No. 61, Cerebrospinal fluid.	"

Total cases..... 2 { Bovine type..... 0 / Human type..... 2

Note: For other cultures from cerebrospinal fluid see under generalized tuberculosis.

Dr. Adami relinquished the chair to Dr. William H. Welch, of Baltimore, who presided during the remainder of the Joint Session.

STUDIES IN ATYPICAL FORMS OF TUBERCLE BACILLI ISOLATED DIRECTLY FROM THE HUMAN TISSUES IN CASES OF PRIMARY CERVICAL ADENITIS.

SPECIAL REFERENCE TO THE THEOBALD SMITH GLYCERIN-BOUILLON REACTION.

By Charles W. Duval, M.D.,

Professor of Pathology, Tulane University, New Orleans.
(From the Pathological Laboratory of the Montreal General Hospital.)

Introduction.

Koch's statement in 1901[1] that bovine tubercle bacilli are quite incapable of infecting human beings has led to much careful research being devoted to the identification of the type of tubercle bacilli which can be derived from tuberculous lesions in man. As one of the criteria of type, the glycerin-bouillon test introduced by Theobald Smith[2] in 1905 has been used to separate the human from the bovine type. It has now been established that the bovine bacilli can be implanted upon and grown in human tissues, where they produce lesions of tuberculosis. My own studies have been devoted to the identification of the types of tubercle bacilli derived from cultures from a small series of cases of primary cervical adenitis. The clinical course of the disease in the several instances was quite similar, while the tubercle bacilli isolated and studied carefully over a period of two years have proved to be distinct from one another. On the other hand, the clinical appearances observed in these cases were quite different from those usually observed in tuberculous cervical adenitis, and led directly to my undertaking a study of the bacilli yielded by the lesions.

The four cultures which form the basis of this communication were studied with the view of determining, if possible: (1) the type of infection; (2) whether the growth features, reaction changes in glycerin bouillon, and virulence for rabbits and guinea-pigs remain relatively constant for a period extending over years; (3) if transitory changes occur in virulence, growth, and reaction in bouillon, which might explain the so-called "intermediate" types of bovine and human cultures which have been described; (4) whether the

T. Smith glycerin-bouillon test serves to determine degrees of adaptation in man to bacilli of the lower host-species.

A pure culture was obtained in each case by transplanting portions of the infected tissues from the neck to a modified egg medium compounded and prepared as follows: The yolks are carefully separated from the whites of twelve eggs and each dropped separately and aseptically into a flask containing 100 c.c. of human blood serum, 200 c.c. of distilled water, and 10 c.c. of glycerin which has already been sterilized by the intermittent method of sterilization (Arnold). The flask is now thoroughly shaken and the mixture carefully tubed. These tubes are heated in the slanted position at a temperature not exceeding 70° C. until the consistence of the medium is sufficiently firm to insure its holding together when the tubes are in the upright posture. It is essential to obtain the egg mixture sterile in the test-tubes before they are inspissated, so that the one heating, which is necessary to solidify the medium, suffices. This gives a soft, golden-yellow medium, with plenty of water of condensation. The cotton plugs are paraffined to keep the medium moist.

The inoculated egg medium presented within five to seven days visible growth in the form of discrete colonies over and about the implanted material, resulting within two weeks in the development of large, elevated, tubercular masses.

From the original cultures, a growth upon glycerin bouillon was initiated by depositing upon sterile paper "floats" masses of egg culture. Further, guinea-pigs were inoculated subcutaneously with tuberculous material from the neck. After the tuberculous process was set up, portions of the caseous glands were planted upon the modified egg medium. The growth thus obtained was transferred to glycerin bouillon by the method described above. The results of variation in biochemical reactions referable possibly to the difference in mode of isolation will be commented upon later.

After the initial isolation, observations upon growth features, reaction changes in glycerin bouillon, and virulence for rabbits and guinea-pigs were observed as to their relative constancy over an extended period.

The glycerin-bouillon tests were carried out with the following technic: Three to six siphon-flasks were simultaneously inoculated from the same culture and controlled by similar transplants of human, bovine, and avian standard cultures of the same age and grown upon the same medium.

Titrations were begun from the new cultures and the controls as soon as peripheral growth appeared about the floating transplants. It should be noted that before inoculation all the bouillon, which was prepared in the usual way from fresh muscle infusion, was accurately standardized and the percentage of acidity of each carefully tabulated. Throughout the experiments 500 c.c. flasks were employed in order to provide for the waste by

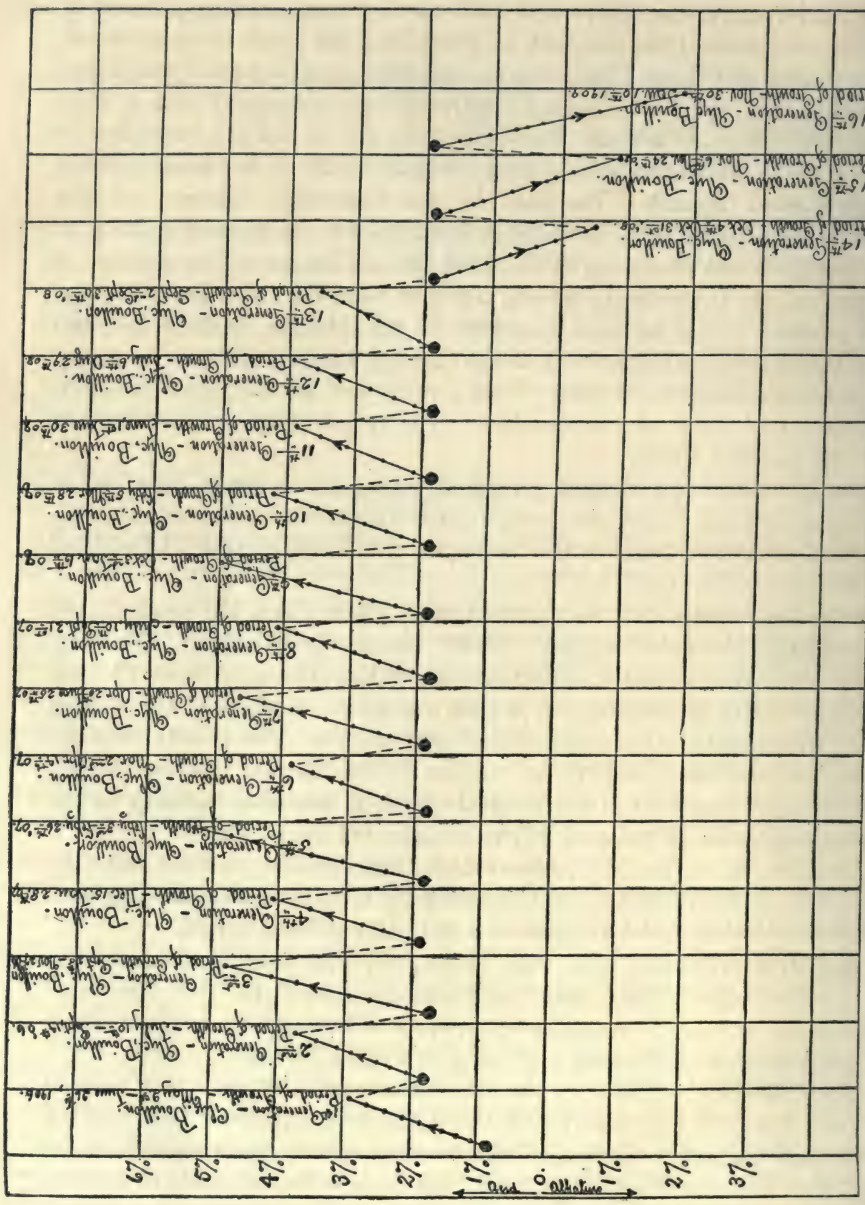


Chart I.—Showing the reaction upon glycerin broth of Culture I over continuous period of thirty months. Dots upon arrowed lines indicate titration intervals. Note the complete change in reaction for the fourteenth generation.

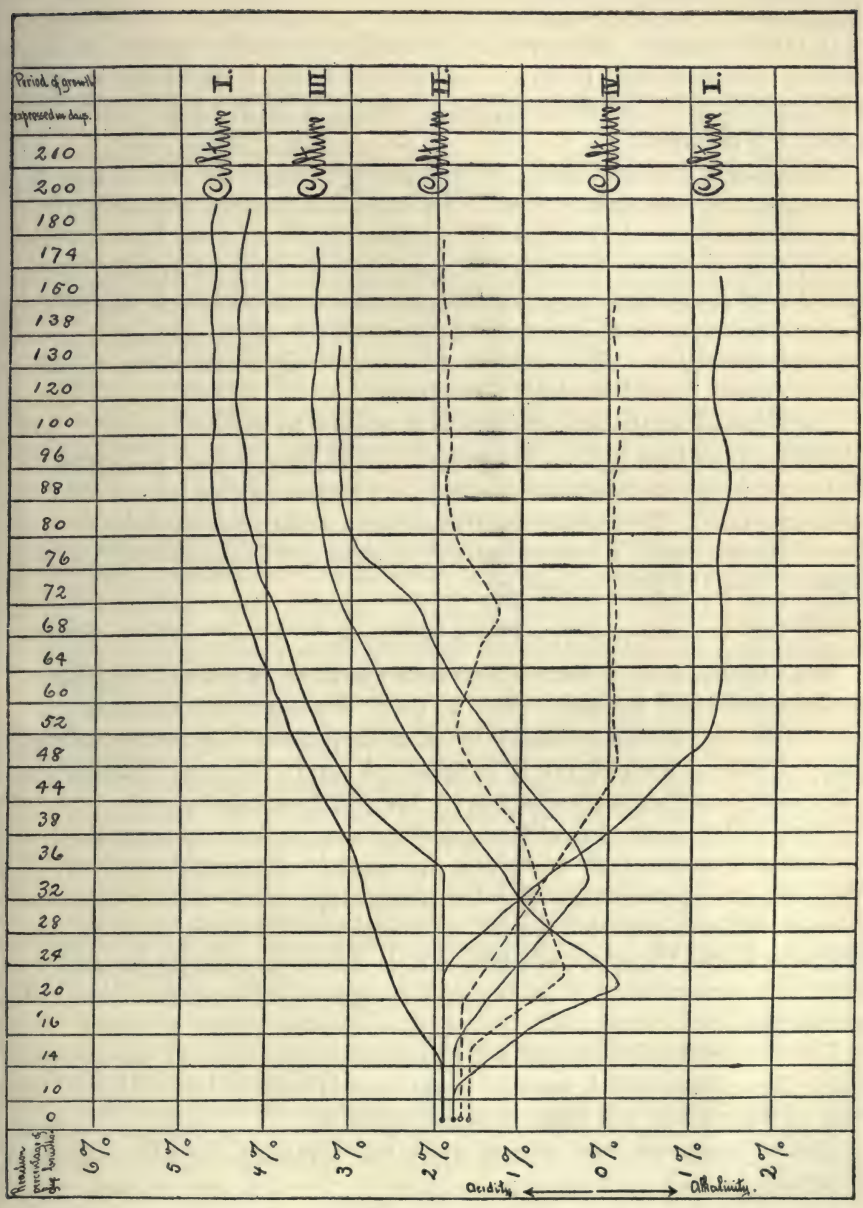


Chart II.—Illustrates the glycerin bouillon curves. Unbroken lines represent "atypical reaction" curves.

titration and loss by evaporation and to make possible an accurate comparison of the inhibitive influence of the growth products of the different cultures. Titrations were repeated at intervals of one to two weeks over a period of six to twelve months. The quantity for all titration tests was 5 c.c. of the bouillon culture-medium in 45 c.c. of distilled water. The initial acidity of the glycerin bouillon was varied, and a series of 1, 1.5, 2, 2.5, and 3 per cent. acidity was observed.

Finally, as a collateral study, various modifications of the ordinary bouillon preparation were employed with the view of determining whether growth or reaction was altered; for instance, additions of small quantities of ox-bile and glycogen to the bouillon, and the employment of special infusions from beef, chicken, and human muscle, with and without the addition of glycerin and peptone, were used, but without demonstrable effect upon growth or biochemical reactions. The same may be said of glycerin-bouillon cultures matured under partial anaërobic conditions.

The virulence of the new cultures with relation to growth variations was determined from time to time and compared with the virulence of the standard type cultures by subcutaneous and intravenous inoculations of rabbits and guinea-pigs. The dosage was standardized as far as possible by weighing and emulsifying in physiological salt solution equal quantities of growth material from the various cultures.

The Clinical Cases.

In all the cases the tuberculous process manifested itself as a rapidly increasing swelling of the neck, which in every way simulated an acute pyogenic infection. It was necessary in two of the patients to perform a tracheotomy to relieve the respiratory distress. A careful physical examination failed to show any signs elsewhere in the body of tuberculosis.

Three of the cases died of acute disseminated miliary tuberculosis in a few weeks after the first symptoms of cervical enlargement were noted. The fourth case was treated with tuberculin and apparently made a complete recovery. It was remarkable with what rapidity the tuberculous swelling disappeared after the administration of T. R. tuberculin, though the culture isolated was proved to be of the bovine type, except for its want of virulence for rabbits.

The three autopsies showed a primary tubercular focus in the cervical lymph-glands from which resulted acute general miliary tuberculosis. In none of these cases was there a mixed infection.

The following are brief clinical notes and abstracts from the autopsy protocols:

Case I. *Clinical History.*—Mrs. L., forty-nine years old, a native of Canada, who lived on a farm all her life, entered the Montreal General Hos-

pital June 4, 1906. Three weeks before admission she noticed for the first time a swelling on the left side of the neck, which rapidly increased in size during the next five days, when it ruptured and discharged. In two weeks the swelling had spread over the entire left side of the neck from the lower jaw to the clavicle. At no time did the mass cause pain or give rise to tenderness on pressure.

On admission to the hospital there was a large fluctuating mass, approximately the size of the closed fist, on the left side of the neck, extending from the anterior border of the trapezius muscle forward to the median line. The skin over the tumor was tense, shiny, and adherent. Below the angle of the jaw there was an open wound leading into a large cavity. The carotid vessels and parts of the brachial plexus were denuded and the left parotid gland was involved in the mass. The tonsils and lymphatic glands on the right side of the neck, as well as the superficial nodes over the rest of the body, were not enlarged. The patient has neither cough nor expectoration. Following incision a stained smear preparation of the pus was crowded with acid-fast bacilli. The bacilli occurred for the most part in closely aggregated masses, and in order to obtain them sufficiently scattered for a microscopical study it was necessary to dilute one part of the pus in three parts of water. The thinner parts of the expressed material contained myriads of pinhead and smaller sized reddish-brown granules, which, when crushed and stained, proved to be pure masses of the bacilli.

A small quantity of the pus was transplanted upon modified egg medium and also upon the ordinary culture-media and incubated at 37° C. The egg mixture after four or five days became thickly studded with discrete colonies, 1 mm. in size, which proved to be acid-fast bacilli. All the inoculated tubes of ordinary media remained sterile—a fact especially significant in view of the necrotic condition of the tissues and the presence of an open avenue for secondary infection.

Full-grown guinea-pigs and rabbits were inoculated subcutaneously and intraperitoneally with 0.5 c.c. each of the pus from the neck. The guinea-pig and rabbit that received intraperitoneal injections died within fifteen days of generalized tuberculosis. There was no intercurrent infection in either animal. Both animals, in addition to the miliary tubercles which studded the various organs, showed a pleuritis and pericarditis with effusion. The rabbit inoculated subcutaneously died on the twenty-sixth day. The autopsy revealed an advanced tuberculosis, the lungs, liver, and spleen showing the most extensive involvement. The guinea-pig similarly inoculated died on the fourteenth day of disseminated tuberculosis. Pure cultures of tubercle bacilli were recovered directly upon modified egg medium from the spleen of each animal.

From the date of admission the patient failed rapidly, and died five days later from acute general miliary tuberculosis; or four weeks after the first appearance of the disease.

Autopsy.—Sixteen hours post mortem. Body of a well-nourished woman. The whole left side of the neck is occupied by a large nodular mass which extends from the lower jaw to the clavicle and from the trapezius muscle to the median line in front. Over the tumor are three linear incisions; the largest measures 6 cm. in length and opens into a cavity which is roughly the size of an orange. The edges of the incisions are gaping, the surrounding

tissues are friable and of a purplish-black color. Traversing the largest cavity are the exposed sternocleidomastoid muscle and the trunks of the brachial plexus. This cavity communicates with smaller ones in the left submaxillary, sublingual, and parotid regions.

The peritoneum and pleuræ are beset with disseminated miliary tubercles.

The lungs are crepitant throughout, and everywhere beset with innumerable discrete tubercles. No evidence of old tuberculous foci.

The other organs, aside from acute miliary tubercles, show nothing remarkable.

A pure culture of B. tuberculosis was isolated from the heart's blood on egg medium, twelve or more colonies developing from six platinum loopfuls of the blood.

Anatomical Diagnosis.—Primary tuberculosis of the right cervical lymph-glands; acute general miliary tuberculosis; B. tuberculosis septicemia.

The tuberculosis in this case was undoubtedly primary in the cervical glands, for a most careful search at autopsy failed to reveal any older focus.

In the human tissue the tubercle bacilli were quite long and slender and transversely segmented. They retained Gram's stain readily. Indeed, even in tissue-sections fixed in Zenker's fluid, embedded in paraffin, and treated in the usual routine manner with eosin-methylene-blue, the bacilli were stained intensely with eosin. This I have not seen before; and so unusual is it for them to stain in tissues without the employment of special methods, I was inclined at first to doubt their authenticity.

The bacilli were so numerous in the sections of the human spleen and lymph-nodes that it was difficult to discern clearly the nuclei of the tissue-cells even in fields where there was no necrosis. The organisms occurred without definite arrangement. Frequently the bacilli were packed so closely together that whole fields of the microscope consisted of one dense layer of slender, beaded rods. In those parts of the sections where the bacilli were less dense, large numbers of them appeared within mononuclear leukocytes. These engorged cells were analogous to the phagocytes for red blood-cells, so common in the lymphoid structures in typhoid fever. One could frequently count fifty or more bacilli within a single cell. The descriptions of occurrence of enormous numbers of leprosy bacilli in human tissues are inadequate to convey a correct idea of the picture here presented in tuberculosis. Lydia Rabinowitsch,[3] however, describes a similar distribution of bacilli and phagocytic cells in tuberculous tissues of fowls.

The bacilli when cultivated on artificial media presented an entire change in morphology from that observed in the tissues; instead of the long, slender, beaded rods, appeared small plump bacilli almost coccal in character, and without a suggestion of transverse massing of the chromatin. On egg-medium the first generation presented a most curious arrangement of the

bacilli, which even the manipulations with the platinum loop failed to disturb. The individual rods occurred one behind the other in parallel rows, forming broad, wavy bands that extended across many fields of the microscope. This end-to-end arrangement of the individual organisms is most unusual in tubercle bacilli and resembles the appearance met with in anthrax colonies.

The character of the growth on ordinary media employed for the cultivation of tubercle bacilli completely corresponds with the human type of culture. The growth was always very dry. Though sometimes fine and film-like, the culture at other times was luxuriant, lumpy, and of wax-like whiteness. It never presented the "moist appearance" that is said to be characteristic of avian cultures. A feature of the bacillus was its prolonged viability on artificial media; a profuse growth having been obtained from the original culture, which had been sealed and kept corked at room temperature for more than two years. Lydia Rabinowitsch[3] claims that prolonged viability is a distinguishing feature of the avian bacillus; in some instances under refrigeration the culture remaining alive for two years. Culture I not only remained viable for a period of years at ordinary temperature, but retained its virulence for rabbits and guinea-pigs.

The results of animal inoculation with culture I afforded a complete illustration of the possible variation in the histological lesion. There was a distinct difference in the microscopical character of the human lesion and that produced experimentally. The subacute inflammatory type of lesion in man, which also occurred in the earlier experimental animals, was a striking feature, and would indicate an extremely high degree of virulence. The lesion in man consisted chiefly of lymphoid and plasma cells and large numbers of polymorphonuclear leukocytes, with only an occasional epithelioid type of cell and no giant-cells. In the experimental lesion produced by the culture somewhat attenuated in virulence the epithelioid elements with central necrosis and giant-cells predominated. Giant-cells did not occur in the earlier rabbits and guinea-pigs inoculated, nor in the lesions of the chickens. In later experiments, however, the animal tissues showed numbers of giant-cells associated with the lesions. It would seem that the occurrence of giant-cells in tuberculosis, as in glanders,[4] depends more on the virulence of the organism than on any other factor. This culture at least suggests that the type of lesions, whether exudative or proliferative, is due to the number and virulence of the bacilli.

Lydia Rabinowitsch[3] noted in avian tuberculosis distinctive differences in the histological picture. In the fowl the alveoli of the lungs were filled with an exudate composed of epithelioid and lymphoid cells, together with numerous giant-cells containing large numbers of the tubercle bacilli. This author attaches special significance to these large cells filled with an enormous

number of bacilli, and regards them as characteristic of avian tuberculosis. This same histological picture is seen in the human and experimental lesions produced by culture I. Here the lymphoid and large mononuclear cells were crowded with bacilli and presented an analogous picture in this respect to leprosy.

The culture, after it had become attenuated in virulence, produced, after repeated intravenous injection, a lesion in the glands of the rabbit which exhibited a certain histological resemblance to that of Hodgkin's disease, such as Dorothy Reed,[5] Longcope,[6] and others have described. The microscopical section of the glands showed an extensive hyperplasia of the lymphoid tissue, with large numbers of the lymphoid cells in mitosis. At the center of the lymphoid follicles there were well-defined collections of endothelial cells, and in the lymphoid tissues were great numbers of similar cells, which in places occluded the sinuses. Plasma cells were markedly increased throughout the gland. The polymorphonuclear leukocytes and eosinophiles (amphophiles) were especially numerous. What appeared to be epithelioid cells, together with large numbers of giant-cells, completely obscured the normal structure of the gland.

The virulence of the culture was tested for rabbits and guinea-pigs, the animals being approximately of the same age and weight. Chickens, pigeons, and rats were also used. Each comparative test was made intravenously, intraperitoneally, and subcutaneously with rabbits, guinea-pigs, and pullets. In order to insure a uniform dosage a weighed portion of surface growth from bouillon was thoroughly emulsified in salt solution and subsequently injected. One milligram of culture given intraperitoneally produced a fatal tuberculosis in these animals in four to six weeks. The same dose administered subcutaneously required a much longer time to produce the same result, and in some instances both guinea-pigs and rabbits lived for months. Ten milligrams, however, when injected subcutaneously, gave rise to disseminated tuberculosis in six to ten weeks.

A series of six chickens, three hens and three pullets, received each 1 mgm. of the culture intraperitoneally, subcutaneously, and intravenously. Six weeks later the fowls were killed and the two pullets which had received intraperitoneal and intravenous injections showed well-marked lesions of tuberculosis. The mesentery of the intraperitoneally injected pullet presented numerous discrete, 2 mm. sized tubercles. No lesions in the other organs were noted. The pullet which received an intravenous injection showed a number of small tubercular nodules in the lungs and spleen. The subcutaneously inoculated pullet and the three hens presented no trace of tuberculosis. When we consider the small dosage and the short period allotted the chickens to live, the occurrence of macroscopical lesions is most remarkable. Larger doses invariably produced

lesions in the half-grown chickens, which, as Bang claims, are far more susceptible than full-grown fowls. Positive results occurred in chickens following intraperitoneal inoculation with greater frequency than for any other method of introduction. As controls, fowls were injected with bovine IX and human XII (Theobald Smith) with negative results. These tests with the smaller laboratory animals and with fowls are far too few to permit of final conclusions; still it would seem that the culture is possibly avian in type.

The reaction curve for this culture in glycerin bouillon was decidedly atypical for more than two years. It always gave an increase in the percentage of acidity, without the initial fall that is so characteristic of all tubercle cultures. The reaction was occasionally delayed for weeks after the growth had completely covered the bouillon surface (a feature in my experience not peculiar to any strain), but when the change in reaction began, there always occurred a constant rise, until an elevation of five or more points higher than the initial acidity was attained, after which there was no further change.

For a period of more than two years after the culture was recovered from the human tissue the behavior toward glycerin broth was certainly unlike any known human or bovine type of organism, since invariably it failed to produce the "initial fall" in the acidity percentage. Again, during this period the culture did not behave in respect to glycerin bouillon as the control avian culture (Smith), which, as O. Bang[8] first pointed out, describes the same reaction curve as the bovine, namely, a gradual decline in percentage acidity until an alkaline reaction results. Quite recently, however, this culture has given a complete change in the reaction curve.

It has been my practice each month since the isolation of the culture to make fresh transplants upon glycerinated bouillon to determine whether subsequent generations might not show a variation in reaction. I was therefore surprised to discover after two and one-half years that the culture suddenly underwent a complete reversal in its action upon glycerin, producing now the typical curve of the avian bacilli.

The organism from this case (culture I) was regarded at first as a modified avian bacillus or an "intermediate" between the avian and human types. Its prolonged viability under artificial conditions and the production of tuberculosis in the fowl are points indicating an avian histogenesis, but the former high acid production and the absence of moist growth on media do not correspond to the typical avian bacillus. However, the recent behavior upon glycerin bouillon leaves little doubt that it is avian in type.

Case II. *Clinical History.*—Samuel B., twenty years old, a native of Ireland, entered the Montreal General Hospital in October, 1906, complaining of shortness of breath and great weakness. Two weeks before admission

he had noticed for the first time a swelling on the right side of the neck, which rapidly increased until it attained approximately the size of an orange.

The patient was poorly nourished and had a temperature of 104° F. There was a large, movable, insensitive mass situated above the right clavicle, extending upward as far as the level of the hyoid bone and downward behind the clavicle, where it became continuous with an area of mediastinal dullness. Subsequently the temperature ran a septic course. Diarrhea became persistent. This swelling was opened under surgical precautions and a large amount of creamy yellow material removed. A portion of this was immediately spread over modified egg-medium, which after three weeks at 37° C. developed a pure culture of the tubercle bacillus. The ordinary culture-media inoculated at the same time remained sterile. Stained smear preparations of the pus from the neck showed only a moderate number of short, thin, acid-fast bacilli. The first growth on artificial media was not luxuriant and rather slow in development, but there was no difficulty in getting transplanted "floats" from the original culture to grow on glycerin bouillon. Pus was injected intraperitoneally and subcutaneously into rabbits and guinea-pigs. The rabbits which received an intraperitoneal inoculation died six weeks later of generalized tuberculosis, while the one which had been injected subcutaneously, when killed four months afterward, showed only tuberculosis about the site of inoculation and small nodules in the lungs. Both guinea-pigs died of tuberculosis—the intraperitoneal animal in five weeks and the subcutaneous one in nine weeks. Though the period of life is longer for this series of animals than those of Case I, the apparent difference in degree of virulence of the two cultures could well be due to the great disparity in the number of bacilli injected.

Autopsy.—Fifteen hours after death. Subject emaciated. On the right side of the neck there is a swelling that extends from the jaw downward and behind the clavicle. Over this area is an incision 3 cm. in length, which exposes a large mass of yellowish-white, necrotic material. On opening the mass it is found to be continuous with another in the anterior mediastinum, which is approximately 12 cm. by 16 cm. in extent and completely encircles the trachea. Both the anterior mediastinum and neck tumors are composed of what appears to be greatly enlarged caseous glands which have fused into one elongated mass. The other superficial lymphatic glands of the body are not enlarged.

The right pleural cavity contains 500 c.c. and the left 200 c.c. of clear serous fluid. The posterior surface of the right lower lobe is covered with fibrinous exudate. On section this lobe is studded with areas 2 to 4 mm. in diameter. The other organs contain tubercles.

Anatomical Diagnosis.—Glandular tuberculosis; acute miliary tuberculosis of the liver, spleen, and kidneys; acute tuberculous pleuritis.

The organism recovered from this case—designated culture II—belongs undoubtedly to the human group of tubercle bacilli. Though the growth was always slow to develop on glycerin bouillon, the culture corresponds in other features, especially virulence for rabbits, to the human variety; and, further, while the biochemical reaction, as interpreted by glycerin-bouillon titrations, showed at times aberrations from the normal, the curve furnished by this organism was found, on the whole, to tally closely with the human type.

CASE III. *Clinical History.*—Francesco B., twenty-four years old, entered the Montreal General Hospital in October, 1906, complaining of a swollen neck and difficulty in breathing and swallowing. Personal history negative. Both sides of the neck were enormously swollen, but not painful or tender. There were fluctuating masses on both sides of the neck, extending from the mastoid processes to the clavicles. They were so large that the patient breathed and swallowed with great difficulty.

The day after admission to the hopsital the patient had three very severe attacks of dyspnea. At these times he became markedly cyanotic and tracheotomy was necessary to save life. The third day after admission the mass on the right side of the neck was incised and 16 ounces of thick creamy pus and caseous material removed. The mass on the left side was opened on the following day and 8 ounces of pus evacuated. A portion of the pus was transferred to egg-medium, which showed a pure growth of tubercle bacilli after ten days' incubation.

A pair of guinea-pigs and rabbits were inoculated subcutaneously and intraperitoneally with a portion of an emulsion prepared from the discharge. The rabbits were killed, one four weeks, the other three months, after inoculation. The intraperitoneally injected animal showed no trace of tuberculosis, while the one which was subcutaneously injected contained definite tuberculous lesions at the site of injection and in the glands of the groin. The guinea-pigs injected had increased in weight. The superficial inguinal glands of the subcutaneously inoculated animal were enlarged and contained infarcts and caseous nodules. In the intraperitoneally inoculated pig the only tubercular lesion presented itself in the omentum. The cultures recovered from these animals in no way differed from the one obtained directly upon artificial medium from the human tissues.

The patient after operation rapidly lost weight and developed fever. At no time was there any sign of pulmonary disease. The patient died on October 31st of sudden cardiac failure, five weeks after the first symptoms were noted.

Autopsy.—Thirteen hours post mortem. Body of a fairly well-developed and emaciated Italian man. On either side of the neck, which is enormously swollen, there is a deep incision, 3 cm. in length, the edges of which are gangrenous.

Peritoneal Cavity.—The omentum and intestines are glued together by recent fibrinous adhesions. The parietal peritoneum is studded with glistening tubercles. The mesenteric lymph-nodes are enlarged and caseous.

The lungs, spleen, liver, kidneys, and brain are thickly studded with minute pin-point, translucent tubercles. No old lesion in the lungs.

Cecum, descending part of the colon, and the lower part of the ileum contain numerous tuberculous ulcers.

Anatomical Diagnosis.—Primary tuberculosis of the cervical glands; acute general miliary tuberculosis; acute ulcerative enterocolitis.

A comparative study of the culture isolated from this case—designated culture III (atypical)—corresponds with the human variety of tubercle, except in regard to its behavior at times upon glycerin broth, where it yields a neutral or 0.5 per cent. alkaline reaction before the rise in acidity is established.

The culture possesses a low degree of virulence for guinea-pigs and rabbits. Full-grown rabbits seldom developed tuberculosis following intraperitoneal injections of 10 mgm. of fresh culture. Adult guinea-pigs inoculated intraperitoneally with the same amount frequently increased in weight, and when killed three months afterward showed only a few nodules in the omentum.

Case IV. *Clinical History.*—Antonio C., aged sixteen, entered the Montreal General Hospital in March, 1908, complaining of a swollen neck. On admission the patient is a well-developed and nourished Italian boy. The cervical glands are enormously enlarged on both sides of the neck, and range in size from a marble to that of a hen's egg. They are discrete, freely movable, and give no tenderness on pressure. The mediastinal glands on percussion are found greatly enlarged and apparently continuous with the cervical mass. The axillary, inguinal, and other superficial glands of the body are not enlarged, but the abdominal glands can be distinctly palpated. The heart and lungs are normal. One week after entrance to the wards the swelling of the neck greatly increased in size and became less nodular in character; instead of freely movable, discrete masses, there is now a solid tumor which extends from the jaw downward under the clavicles and into the mediastinum. The swelling was opened under aseptic precautions, and a gland 2 by 1 cm. in diameter removed for bacteriological study. On section, it was firm and contained large, yellowish-white areas; no bacilli, however, were demonstrable in the stained smears. Cultures were obtained directly upon egg-medium from transplanted pieces which were excised from the central part of the gland. The ordinary laboratory media inoculated remained sterile. The egg-medium showed the first sign of growth after three weeks, when it became studded with small colonies of the tubercle bacillus.

Soon after admission the patient was given at regular intervals in gradually increasing doses TR. (tuberculin), under which treatment the cervical enlargement completely subsided. The glandular mass in the neck began to diminish in size from the first dose. Those in the mediastinum and the abdomen also disappeared. The patient gained markedly in weight, and the temperature fell to and remained normal. He was discharged apparently well one month after the first administration of the tuberculin.

The culture from this case, designated IV, completely corresponds in respect to growth and reaction upon glycerin bouillon to the standard bovine type; however, it does not correspond in degree of virulence for rabbits. Fifty milligrams of fresh culture emulsified in 5 c.c. of sterile salt solution and injected intravenously into the ear of the rabbit failed repeatedly to produce lesions. Rabbits inoculated subcutaneously with the same dosage did not develop disseminated tuberculosis; and when killed months afterward, presented lesions only at the site of inoculation or in the regional lymph-glands. On the other hand, guinea-pigs injected intraperitoneally with 10 mgm. of the culture rapidly developed generalized tuberculosis. As

yet I have not tested the virulence of the culture for calves. In respect to growth, the culture always manifested a tendency to develop slowly. Though under artificial cultivation for nearly a year, it still refuses to grow on glycerin-agar. On glycerinated bouillon growth increases very slowly, though always as a colony-mass, and at no time film-like, which is so often the case in feebly growing bovine cultures. For the present, at least, I regard culture IV as an atypical bovine variety of the tubercle bacillus possessing a low degree of virulence for rabbits. Atypical cultures producing a neutral or slightly alkaline reaction upon glycerin broth have been described by Theobald Smith[9] and O. Bang,[8] and regarded by them as "atypical" human rather than bovine in type; however, the slow multiplication of culture IV on the more favorable media and the inability to grow at all on glycerin-agar, together with the fact that it produces a neutral or slightly alkaline reaction, are factors strongly in favor of a bovine nature.

The Glycerin-bouillon Reaction as a Differential Test.

Theobald Smith[10] in 1905 described the difference in behavior of "bovine" and "human" bacilli toward glycerin bouillon which corresponded with the author's previously recognized variation in virulence. Before the glycerin-broth test was known, however, the differentiation of these depended mainly on virulence and rapidity of growth. The feeble and slowly growing organism, if highly virulent for rabbits when injected intravenously, was regarded as bovine in type; while the luxuriant and rapidly growing culture that possessed a low degree of virulence for rabbits was classed as the human variety.

In my experience the glycerin-bouillon test is more reliable than "degree of virulence" in the differentiation of mammalian strains, provided it is repeated over a long period of time. Even with regard to avian cultures O. Bang[8] claims that the alkalinity produced in glycerin broth is so much greater than the bovine type that it serves to distinguish between them. My observations upon the behavior of culture I are in accord with this finding.

The test, which consists of growing the organism on the surface of glycerin bouillon and titrating from time to time to note the change in reaction, not only divides the tubercle family into two distinct groups, but it may be a qualitative means of detecting bacilli of the modified bovine type in the human body or the degree of adaptation. Though the method does not sharply differentiate between bacilli of the lower host species, it is of aid in the identification of these lower type forms in the human body. Differences in virulence and character of growth are too variable to allow us to admit unreservedly that one type may become transformed into another through animal passage. These properties, even with the same culture,

vary within wide limits, more especially in the growth features, which depend so largely on the nature of the culture-medium. Yet it would seem that these modifications in biological and pathogenic characters have been the crucial tests employed by those who claim to have transformed the avian into the bovine type of bacillus.

L. Rabinowitsch,[3] in a study of 95 avian cultures, noted a whole growth scale from the typical, moist, shiny growth of the avian to the dry, scaly appearance of the mammalian type of bacillus, and is most emphatic that from three birds she isolated cultures that were identical with the human type of the bacillus. She also claims to have completely transformed a typical avian culture into the human type of bacillus by repeated passage through animals. In view of the fact that she draws particular attention to the inconstant and interchangeable differences in growth and virulence of the mammalian and avian bacilli, and that in morphology and staining reaction there is no essential variation, it is hard to understand how "atypical" forms were definitely determined, especially as there is no mention of the glycerin-bouillon reaction. If we regard the tubercle bacilli of the different host species as variations of the same family, the existence of "intermediate forms" is not only possible, but highly probable. There is reason to believe that aberrant types of the tubercle bacillus exist as they do for other bacterial species, but there is as yet no absolute test by which the finer differences may be determined. Our present methods at best are too inadequate to permit us to state positively with regard to "intermediate" forms of the tubercle bacillus. Some so-called atypical cultures that have at first behaved unlike the standard types, if repeatedly tested over a longer period of time, might eventually fall into the well-known groups. The most striking examples of this change have occurred with cultures I and III of this series.

It would seem that these strains have only recently accepted a new environment and are but slightly altered by the host influence. In this way it is possible to explain their odd behavior upon glycerin broth after a year's sojourn outside the animal body. For more than a year culture III, though constantly under cultivation and repeatedly tested, always approached, but never reached, the neutral point when grown in glycerin bouillon, nor was there any rise in acidity though the flasks were kept for months. Subsequent tests, however, have shown the fall in reaction to the neutral point to be followed by a rise in acidity. On two occasions the reaction fell slightly below the neutral point, and later arose in acidity higher than the original percentage (see Table I). This latent action on glycerin occurred not only for the culture recovered directly from the human tissue, but also for the one recovered through guinea-pigs. The question of a mixed tubercle infection is possible, but hardly probable, in this case.

The glycerin-broth test at first indicated that the culture was a "modified" bovine, but its subsequent behavior in this medium, together with other biological peculiarities, makes me regard it as an aberrant human type.

Culture I is the most significant example of the necessity for continued observation over a long period of time. For more than two years it always gave an atypical reaction curve in glycerin bouillon. The medium steadily increased in percentage acidity without fluctuation until it reached four or five points above the initial per cent., where it remained stationary. Recently, however, the culture has shown a complete change in its behavior upon glycerin broth; instead of the rise in percentage acidity, there now occurs a gradual uninterrupted fall to 0.5 to 1.0 per cent. alkalinity, from which there is no further change. This reversal of the metabolic activity of this culture under artificial cultivation is extremely interesting, and would argue–(1) a mixed infection in which the least saprophytic type at first predominated and subsequently the more saprophytic variety predominated, or (2) the culture was originally an avian whose vital function had been altered during its sojourn in the animal body, but not sufficiently to establish it permanently.

These "atypical" cultures in glycerin bouillon show, on the whole, a variation in reaction from the standard types analogous to the variation of the pneumococcus in inulin, which difference in degree of acidity corresponds with differences in growth and virulence.

Explanation of the Glycerin-bouillon Reaction.—To determine the effect of growth upon the glycerin-bouillon reaction the following experiments were carried out: A series of glycerin-bouillon cultures* of bovine, human, and avian bacilli were grown for a stated period at 37° C. All the flasks were then titrated and the reactions carefully noted. Next, one-half of these cultures (a complete series) was retained at room temperature for a further period, and observations upon the reactions carried out at intervals of five and ten days. Finally, the remaining half of the cultures after titration (also a complete series) was transferred from incubator to ice-chest temperature and the reaction noted from time to time under the latter conditions. Observations extended for some series over a period of six months, others three months, and in none was it less than eight weeks. Flasks holding 500 c.c. were employed in the tests in order to contain a sufficient amount of bouillon to permit of repeated removal for titration purposes. In these tests the amount of surface growth and the reaction of the bouillon were purposely varied. The surface growth was shaken to the bottom of the flasks upon removal from the incubator. Under these conditions it was interesting to note that the human type of tubercle showed not the slightest

*Bovine IX and VIII, human XII, and avian II, which were kindly supplied me by Prof. Theobald Smith; and cultures I, II, III, and IV of my own series.

difference in the final reaction from cultures kept undisturbed at 37° C. In flasks containing the human strains where the reaction was beginning to fall toward neutral point at the time of removal from the incubator the acidity did not continue to lower, but eventually rose to a point equal to or higher than the initial acidity (see Table I). It made not the slightest difference in the final reaction whether the growth had been shaken down from the surface of the bouillon or not. Flasks containing the bovine and avian types showed no further change in either direction after they were removed from the incubator. Certainly in the case of the cultures kept at ice-chest temperature there was every reason to believe that the growth had ceased, yet the development of the complete reaction proves that continued growth with the human strain cannot possibly explain the rise in acidity of the glycerin bouillon.

The result of this test does not support the view that the difference in reaction for human and bovine mammalian types of the tubercle family depends on the ability of the living bacilli to split the glycerin molecule with the production of acids, but suggests an autolytic action on the glycerin. Again, avian strains, according to O. Bang,[8] who has tested their action upon glycerin bouillon, produce a neutral or alkaline reaction only when growing on the surface of the medium, which fact also shows that neutralization of the initial acidity is the result of growth activity.

Sometimes with a series of glycerin-bouillon cultures one or more of them may fail to show the slightest change in reaction for months, though the growth is complete and heavy over the whole surface and growing up the sides of the flask. At times a flask whose growth was "complete and down" for more than two months, and so far had not shown the slightest change in reaction, would suddenly begin to rise in per cent. acidity (see Table I).

Occasionally the change in reaction may be so long delayed that the fall to the neutral points occurs before the rise in acidity begins. Again, it is well known that with all types when grown in a broth where no glycerin has been added the reaction drops to neutral or becomes slightly alkaline, and at no time shows a rise in acidity. This trend toward the neutral point must take place in glycerinated bouillon as well; however, with the human type there is, in addition, an action on the glycerin molecule which is distinct, and at times sufficient not only to lower but to cause a rise in the acidity of the glycerin bouillon. Since the number of bacilli undergoing disintegration varies constantly, this factor in itself determines the degree of fluctuation.

That autolysis explains the rise in acidity for the human type of tubercle bacillus when grown in glycerin broth the following experiments show: A series of glycerin-bouillon flasks were first titrated to show distinct variations in reaction, viz., neutral 0.5, 1.0, 2.0, and 3.0 per cent. acidity. To the separate flasks were now added 5 gm. of a bovine, human, and avian culture,

which had been previously grown and removed under sterile precautions from other bouillon flasks. Each flask was now titrated to note whether any change in the reaction had occurred immediately following the addition of the culture, and then placed in the oven at 56° C. for six hours to kill the bacilli. Again after heating the reaction was determined and the flasks placed at ice-chest temperature. Up to this date no change in reaction for any flask had occurred. Four days later the flasks still showed no change from the original reaction. About the eighth day, however, the flasks containing the killed "human" bacilli showed a decided rise in percentage acidity, which from day to day continued to advance, until the final reaction was equivalent to that attained by the living glycerin-bouillon culture under favorable conditions. The flasks containing the killed "bovine" and "avian" bacilli, respectively, failed to show at any time the slightest change in the reaction (see Table II).

The fact that increased acidity occurred in the flasks containing the dead "human" bacilli, and not in the "bovine" or "avian," would indicate that in the autolysis some soluble substance was liberated from the human strain that had a special action upon the glycerin molecule.

The above explanation in the rise in the acidity of glycerin cultures of human tubercle bacilli is, of course, at variance with the statement of the English Commission that this phenomenon was due to the chemical interaction of continued metabolic activity on the part of the human strain.

Virulence.

It is conceded by many that a considerable range in degree of virulence is possessed by the human type of the tubercle bacillus, but T. Smith[12] holds that the most virulent human cultures are not to be compared in virulence with the bovine strains. On the other hand, L. Rabinowitsch[13] states that some human cultures are more virulent for rabbits than the bovine. In this connection it is noteworthy that culture IV of this series, which is a typical bovine type of bacillus according to growth and behavior toward glycerin bouillon, has always manifested a low degree of virulence for rabbits. These animals injected intravenously with 50 mgm. of culture fail to develop fatal tuberculosis.

Culture I when first isolated was equally virulent for rabbits and guinea-pigs and also virulent for chickens. Rabbits succumb approximately within the same period as do guinea-pigs following intravenous injection of 10 mgm. of the culture.

The view held by Arloing[14] and his pupils that bacilli from surgical tuberculosis are less virulent than those of pulmonary disease is not borne out by the study of these cultures, which proves that glandular tuberculosis is not always due to bacilli of reduced virulence or to increased resistance of the host.

TABLE I.—SHOWING THE REACTION OF GLYCERIN BOUILLON FOR CULTURES UNDER DIFFERENT TEMPERATURE CONDITIONS.

Bouillon.	Case.	Culture.	Source.	Virulence.	Inoculation Date.	Titration Dates.		Reaction Per Cent. Acidity.	Remarks.
Beef Inf. 1000 c.c. Peptone 10 grams. Glycerin 40 c.c. Acidity 1.9 per cent.	Mrs. S., age 49, native of Canada. Primary cervical adenitis with fatal tuberculous septicemia.	I (flask "a"). "Atypical" organism with biochemical reactions resembling avian bacilli.	Pus from cervical region. Direct isolation from the human tissue upon modified egg-medium.	Equally virulent for rabbits and guinea-pigs. Chickens are also susceptible.	March 24, 1908.	Apr. 18, '08	Period under Incubator temp.	1.9	Heavy growth covering three-quarters of bouillon surface.
						" 25, "		2.2	Heavy growth covering whole of bouillon surface.
						May 10, "		2.8	Growth completely over surface and up sides of flask.
						" 20, "		3.0	Growth completely over surface and up sides of flask.
						June 1, "		3.2	No change in growth. Flask removed from incubator.
						" 14, "	Period under Room temp.	3.5	Growth at bottom of flask. Bouillon perfectly clear.
						July 4, "		5.0	Growth at bottom of flask. Bouillon perfectly clear.
						Aug. 6, "		5.0	Growth at bottom of flask. Bouillon perfectly clear.
Ditto.	Ditto.	I (flask "b").	Ditto.	Ditto.	March 24, 1908.	Apr. 18, "	Period under Incubator temp.	1.9	Growth heavy, film covering one-half bouillon surface.
						" 25, "		1.9	Growth heavy, film covering three-fourths bouillon surface.
						May 10, "		2.2	Growth over whole bouillon surface.
						" 20, "		2.8	Growth complete and up sides of flask.
						June 1, "		3.0	Growth complete and up sides of flask.
						" 14, "		3.1	Growth allowed to remain on surface of flask.
						July 4, "		4.2	Growth intact over surface of bouillon.
						Aug. 6, "		4.2	Growth intact over surface of bouillon.
Beef Inf. 1000 c.c. Peptone 10 grams. Glycerin 40 c.c. Acidity 2.0 per cent.	Franc. B., age 24, native of Italy. Primary cervical adenitis resulting in fatal acute miliary tuberculosis.	III (flask "a"). "Atypical" unusual reaction in glyc. bouillon.	Pus from cervical region. Direct recovery of culture from the human tissue upon modified egg-medium.	Moderately virulent for rabbits. Highly virulent for guinea-pigs. Avirulent for chickens.	March 13, 1908.	Apr. 18, "	Period under Incubator temp.	2.0	Growth size of half dollar.
						" 30, "		2.0	Growth covers one-half of surface.
						May 10, "		2.0	Growth heavy and complete and up sides.
						" 18, "		2.0	Growth heavy and complete and up sides.
						June 1, "		2.0	Growth heavy and complete and up sides.
						" 14, "		2.3	Growth mostly shaken down.
						July 1, "		0.3	Growth down completely.
						Aug. 5, "		0.3	Growth down completely.

Bouillon.	Case.	Culture.	Source.	Virulence.	Inoculation Date.	Titration Dates.		Reaction Per Cent. Acidity.	Remarks.
Beef Inf. 1000 c.c. Peptone 10 grams. Glycerin 40 c.c. Acidity 2.0 per cent.	Franc. B., age 24, native of Italy. Primary cervical adenitis resulting in fatal acute miliary tuberculosis.	III (flask "b").	Pus from cervical region. Direct recovery of culture from the human tissue upon modified egg-medium.	Moderately virulent for rabbits. Highly virulent for guinea-pigs. Avirulent for chickens.	February 8, 1908.	Feb. 28, '08	Period under Incubator temp.	1.0	Growth heavy and blistered and covers two-thirds of surface.
						March 10, "		Neutral.	Growth complete and up sides of flask.
						" 25, "		Slightly alkaline	Growth complete and up sides of flask.
						April 15, "		0.4	Growth complete and up sides of flask.
						May 1, "	Period under R. t. Incubator temp.	1.7	Final change in reaction.
						" 10, "		1.7	Final change in reaction.
						" 20, "		1.6	Final change in reaction.
	Sam. B., age 20, native of Ireland. Primary cervical adenitis resulting in fatal acute miliary tuberculosis.	II (flask "a"). "Human" biochemical reactions completely correspond to the human type of bacilli.	Necrotic material from the cervical glands. Direct isolation of culture from the human tissue upon modified egg-medium.	Low degree virulence for rabbits. Virulent for guinea-pigs. Avirulent for chickens.		April 18, "		1.9	Heavy growth covering three-quarters of bouillon surface.
						" 25, "		1.9	Heavy growth covering whole of bouillon surface.
						May 10, "		1.5	Growth over whole surface and up sides of flask.
						" 20, "		1.0	Growth over whole surface and up sides of flask.
Ditto.					March 24, 1908.	June 1, "		0.7	No change in growth. Flask removed from incubator.
						" 14, "	Period under Room temp.	1.4	Growth at bottom of flask. No change in reaction.
						July 4, "		4.4	Growth at bottom of flask. No change in reaction.
						Aug. 6, "		4.4	Growth at bottom of flask. No change in reaction.
						April 18, "	Period under Incubator temp.	2.0	Heavy island of growth size of quarter.
						" 30, "		2.0	Heavy covering on half of surface.
						May 10, "		2.0	Heavy growth covering three-quarters of surface.
						" 18, "		2.0	Heavy complete growth over surface.
Ditto.	Ditto.	II (flask "b").	Ditto	Ditto.	March 13, 1908.	June 1, "		2.0	Growth heavy and thrown into deep folds.
						" 14, "		1.3	Growth heavy and up sides of flask.
						July 1, "		0.9	Growth at bottom of flask for more than a month.
						Aug. 5, "		3.3	Growth at bottom of flask for more than two months.

TABLE I.—SHOWING THE REACTION OF GLYCERIN BOUILLON FOR CULTURES UNDER DIFFERENT TEMPERATURE CONDITIONS.—(*Continued.*).

BOUILLON.	CASE.	CULTURE.	SOURCE.	VIRULENCE.	INOCULATION DATE.	TITRATION DATES.			Reaction Per Cent. Acidity.	REMARKS.
Beef Inf. 1000 c.c. Peptone 10 grams. Glycerin 40 c.c. Acidity 2.0 per cent.	Antoine C., age 16, native of Italy. Primary cervical adenitis. Recovery.	IV (flask "a"). "Bovine" growth features and reaction upon glyc. bouillon completely correspond with "bovine bacilli."	Glands of the neck. Direct isolation upon modified egg-medium.	Avirulent for rabbits. Virulent for guinea-pigs. Avirulent for chickens.	August 5, 1908.	Aug 10, '08	Period under Incubator temp.		2.0	Growth size of silver dollar.
						" 14, "			2.0	Growth covers one-half of bouillon surface.
						" 18, "			1.8	Growth completely covers surface.
						" 22, "			1.0	Growth beginning to push up sides of flask.
						" 26, "			0.5	Growth complete and up sides of flask.
						" 31, "			0.1	Growth shaken down in bottom of flask.
						Sept. 3, "			Neutral.	Growth shaken down in bottom of flask.
						" 8, "			Neutral.	Growth shaken down in bottom of flask.
Ditto.	Ditto.	IV (flask "b").	Ditto.	Ditto.	August 5, 1908.	Aug. 10, '08	Period under Inc. temp. Room temp.		2.0	Growth size of half dollar.
						" 14, "			2.0	Growth covers one-half of surface.
						" 18, "			1.0	Growth covers three-quarters of surface.
						" 22, "			0.9	Growth complete.
						" 26, "			0.4	Growth complete and partly at bottom of flask.
						" 31, "			0.4	Growth complete and partly at bottom of flask.
						Sept. 3, "			0.4	Growth complete and partly at bottom of flask.
						" 8, "			0.4	Growth complete and entirely at bottom of flask.

TABLE II.—SHOWING THE BEHAVIOR OF KILLED CULTURES UPON GLYCERIN BOUILLON.

Type B. Tuberculosis.	Glycerin Bouillon		Titration Results							
	Flask No.	Reaction to Phenolphthalein. Per Cent. Acidity.	Immediately after Inoculation.	After Heating at 56° C. for 4 hours.	After 4 Days at 10° C.	After 8 days at 10° C. Per Cent. Acidity	After 12 Days at 10° C. Per Cent. Acidity.	After 16 Days at 10° C. Per Cent. Acidity.	After 20 Days at 10° C. Per Cent. Acidity.	After 114 Days at 10° C. Per Cent. Acidity.
(Culture II).										
Human	1	Neutral.	No change	No change.	No change.	0.5	1.0	1.5	3.0	3.2
Ditto.....	2	0.8	" "	" "	" "	0.9	1.3	2.0	2.9	3.2
Ditto.....	3	1.8	" "	" "	" "	2	2.9	3.4	3.4	5.4
(Smith IX).										
Bovine.....	1	Neutral.	No change.	No change.	No change .	No change.	No change.	No change.	No change.	No change.
Ditto.....	2	0.8	" "	" "	" "	" "	" "	" "	" "	" "
Ditto.....	3	1.8	" "	" "	" "	" "	" "	" "	" "	" "
(Smith XII).										
Human.....	1	Neutral.	No change.	No change.	No change.	No change.	No change.	0.3	0.8	3.0
Ditto.....	2	0.8	" "	" "	" "	" "	" "	1.4	2.0	3.2
Ditto.....	3	1.8	" "	" "	" "	" "	" "	2.1	2.5	2.9
(Culture II).										
Avian.....	1	Neutral.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.
Ditto.....	2	0.8	" "	" "	" "	" "	" "	" "	" "	" "
Ditto.....	3	1.8	" "	" "	" "	" "	" "	" "	" "	" "

Again, culture I is the exception to the rule that with tubercle bacilli there is an inverse relation between the virulence and rapidity of growth. It grew profusely from the beginning and never showed the least tendency to lag when transferred from the solid medium to glycerin bouillon. Old cultures of the organism, when kept at room temperature in sealed tubes for more than two years, have remained highly virulent for giunea-pigs and rabbits, 1 mgm. of the culture producing extensive tuberculosis and death of the animals in four to six weeks.

These cases in some respects resemble clinically one reported by T. Smith[15] in 1898; though in his case there was an old lung focus to which he ascribed the subsequent cervical enlargement. He concluded that the rapid multiplication of the bacilli in the glands of the neck was probably due to the fortuitous assistance of other bacteria accidentally present or subsequently introduced. His culture, however, was a human type of tubercle possessing a low degree of virulence.

Histopathological Lesions.

Both in regard to the human and experimental lesions produced by the cultures herein reported there occurred distinct differences in the microscopical appearance, but in no way could these differences be considered as specific for any particular strain. All gradations, from a subacute exudative to a proliferative type of lesion, were observed.

The histopathological differences, as described by Pfander,[16] for fowl tuberculosis, such as (1) a relative scarcity of giant-cells; (2) caseation that is smooth, solid, and hyaline with little tendency to calcify; and (3) a tendency of the tubercle to become surrounded by a connective-tissue capsule, I have observed, but found too inconsistent to be of any differential value. Again, I have not been able to confirm Baumgarten's[17] view that the tubercles in fowls have less leukocytic infiltration than those in mammals. L. Rabinowitsch[3] states that in chicken tuberculosis there is a tendency for the bacilli to be diffusely disseminated and to occur in definite "heaps," which she has never observed in lesions of experimental mammalian cultures, and she regards these differences as peculiar to birds, though not dependent upon any one type of tubercle bacillus. This "heaping" up of the bacilli and their spreading to all parts of the animal body is beautifully demonstrated in Case I, which would suggest an avian infection in man.

In general the experimental lesions fall under three types: (1) The subacute exudative, which is composed of polymorphonuclear leukocytes, lymphoid, and plasma cells without giant or epithelioid cells; (2) one that consists entirely of epithelioid cells without necrosis or exudation, a type of lesion similar to the proliferated endothelium of the Malpighian bodies of the spleen in diphtheria and other acute infectious diseases; (3) the typical

tubercular lesion, consisting of epithelioid, giant cells, and necrosis. All three types of lesion with intermediate stages can be produced with the same culture by grading the dosage according to the virulence and number of bacilli.

Summary.

The four cultures which form the basis of this communication were recovered from peculiar cases of primary cervical adenitis in man, three of which terminated fatally of disseminated acute miliary tuberculosis in four to six weeks.

A careful comparative study shows that culture II corresponds closely with the "human," and culture IV with the "bovine" type of tubercle bacilli; while cultures I and III present variations from the standard types and are to be regarded as "intermediate" or "atypical" forms.

Culture I is of unusual interest because of its remarkable variations. The clinical picture of the case, the rapid course of the infection, the enormous number of the bacilli in the tissues, their tendency to occur in "heaps" like the leprosy bacillus, the high degree of virulence alike for rabbits and guinea-pigs, the production of lesions in chickens, the ease of cultivation, and the prolonged viability under unfavorable conditions, all mark the organism as a decided atypical form of tubercle bacillus in man. The prolonged viability, the production of lesions in the chicken, and the great profusion of bacillary growth in the tissues would indicate an avian type. Though for years the reaction curve was atypical, it has since changed completely to the "avian" curve. In this connection it is of interest to note that L. Rabinowitsch[3] states that she has isolated avian tubercle bacilli from two cases of tuberculosis in man.

Cultures II and III undoubtedly belong to the human type of the tubercle family, though they were under cultivation and were repeatedly tested upon glycerin broth over a period of months before their identity was definitely established.

Culture IV completely corresponds in growth and reaction in glycerin bouillon to the bovine strain; however, it manifests a low degree of virulence for rabbits, which is exceptional for bovine cultures.

The old belief that bovine bacilli are more slender and beaded in the tissues and are thicker and shorter in culture than the human type I have not been able to confirm. The morphological characters of the different cultures here reported were so inconstant that no reliance could be placed on this feature as an aid in differentiation. Outside of the animal body, it would seem that the differences in size and character of the individual bacilli depend largely on the kind and reaction of the medium, while in the animal body they are influenced by their situation and the resistance of the host.

Under artificial cultivation they may undergo a decided change from the slender, beaded rods to the short plump forms, which on egg-medium become almost coccal in character. It is an interesting fact that these cultures, though morphologically alike in the tissues under cultivation, differ distinctly in type.

The nature of the growth of these tubercle cultures varies for the same culture even under apparently identical conditions. The character of the growth was never an indication of the type of the culture. It was common to obtain two distinct types of growth on the same flask of bouillon, *i. e.*, a portion of the surface would be covered with a heavy and uniformly granular layer of closely packed, wax-like colonies twice the size of an ordinary pin's head, while the other portion would be a dense, homogeneous layer with the typical depressed blisters.

The rapidity of growth also varied greatly for the same culture. Often in a series of twelve or more bouillon flasks which were prepared alike and inoculated with the same culture, some would cover the surface in eight days to two weeks, others would take four to six weeks, still others two to three months. It was thought in the beginning of the work that this variation might depend on the amount of oxygen within the flask or on the change in reaction in the bouillon, but further tests proved that neither of these influenced the rate of growth in any way. It would occur in loosely corked flasks as well as in those that were sealed, and in flasks where the reaction was neutral, acid, or slightly alkaline. It would seem that these changes are by no means specific for any group of the tubercle bacilli, but a property possessed by them all.

The growth of the cultures on solid medium showed approximately the same variation as that from the surface of the glycerin bouillon. The wax-like colonies described by L. Rabinowitsch[3] as characteristic for avian tubercle bacilli were noted at times for all of the cultures. On the modified egg mixture the growth was always more rapid and profuse than on any other medium. I found this egg-medium more certain than any other for the direct recovery of the tubercle bacillus from the tissues. Where it was desired to recover the culture from the animal tissues with certainty and celerity it had no equal. Occasionally in seven days after the inoculation of the tuberculous gland material the growth was sufficiently advanced to transplant to the bouillon flasks.

The "brick-red" color that sometimes occurs in the growth of tubercle bacilli I have not observed as a special feature for any of my cultures. It has occurred at times in all; more often perhaps on the egg-medium. A curious feature for some tubercle cultures is the occasional patchy distribution of color, *e. g.*, there will be sharply defined areas of red amid the ordinary wax-like whiteness of the surrounding growth.

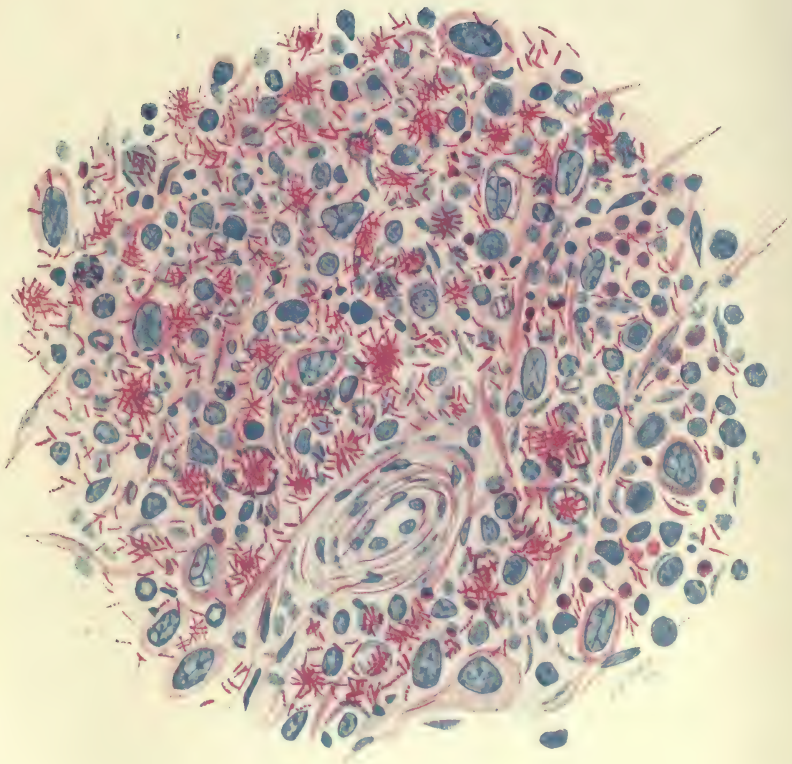


Fig. 1.

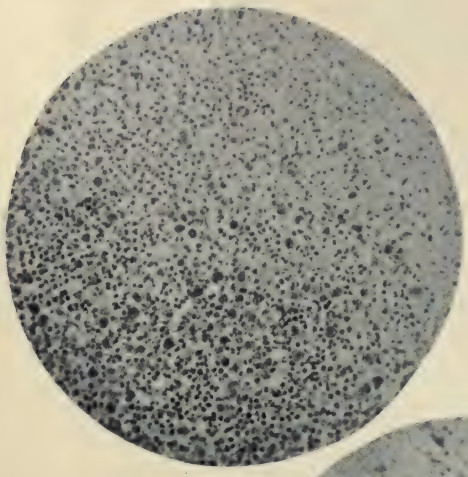


Fig. 2.

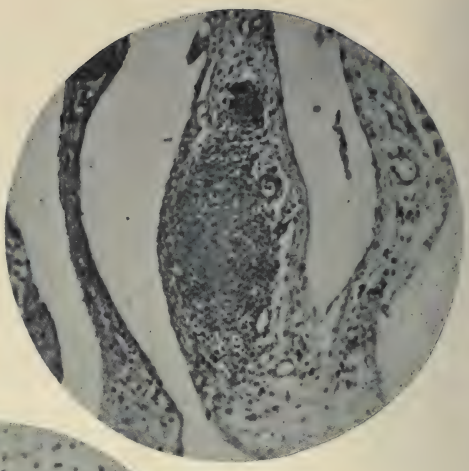


Fig. 3 (*a*).

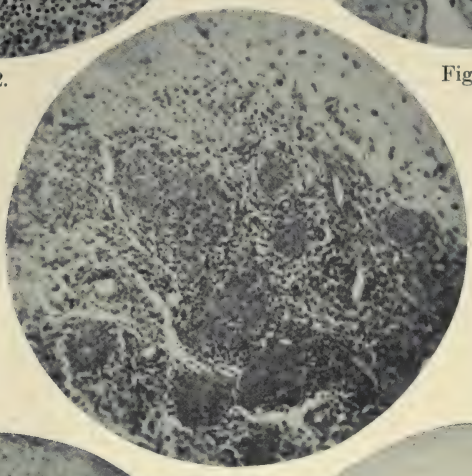


Fig. 4 (*b*).

Fig. 5 (*c*).

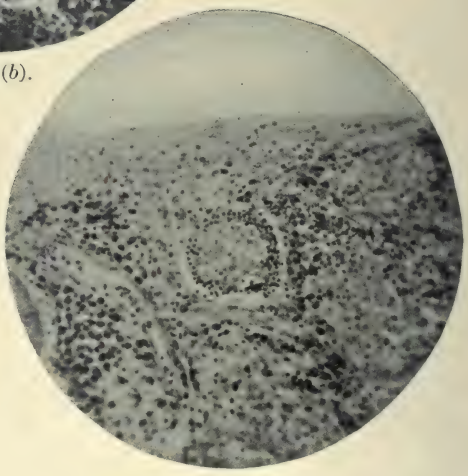


Fig. 6.

The glycerin-bouillon test serves admirably to distinguish between the human, bovine, and avian types of tubercle bacilli. It is also of value in the determination of degrees of adaptation in man for bacilli of the lower host species, and in the recognition of "intermediate" types. The test, to be of differential value, requires repeated application and careful control over a period of months. Some freshly isolated cultures may produce their specific reaction curve in glycerin bouillon within a few weeks. On the other hand, the same culture may fail to give its characteristic reaction, or any alteration in the glycerin bouillon, for several months, though the growth has been luxuriant and complete.

The rise in acidity that occurs in glycerin bouillon for the human type of tubercle bacilli is due to a specific action on the glycerin of the products of bacilli disintegration (autolysis); with the bovine and avian types the products of bacillary disintegration have no action on the glycerin. The fall in acidity which occurs for all three types of the tubercle bacillus is due to the products of metabolic activity.

BIBLIOGRAPHY.

1. Tuberculosis Congress, London, 1901.
2. Jour. of Med. Research, 1905, viii, 253.
3. Virchow's Archiv, 1907, cxc, 246.
4. Jour. of Exper. Med., 1907, ix, 352.
5. Johns Hopkins Hospital Reports, 1902, x, 133.
6. Bull. of the Ayer Clin. Lab., Penn. Hospital, 1903, No. 1, p. 4.
7. Cent. f. Bakt., Orig., 1908, xlvi, 461.
8. Cent. f. Bakt., Orig., 1907, xliii, 34.
9. Jour. of Med. Research, 1905, xiii, 405.
10. Jour. of Med. Research, 1905, xiii, 253.
11. Royal Commission on Human and Animal Tuberculosis, Second Interim Report, 1907.
12. Trans. of the Assoc. of Amer. Physicians, 1896, xi, 75.
13. Arbeiten a. d. path. Inst. zu Berlin, 1906, 365.
14. Berichte internat. Konfer., 1902, 310.
15. Jour. of the Boston Soc. of Med. Sciences, 1898, iii, 33.
16. Path. Anat. und Bakt., 1892, Bd. i.
17. Path. Anat. und Bakt., 1892, Bd. i.

DESCRIPTION OF PLATES.

Fig. 1.—Colored drawing from a section of the human spleen (Case I) to illustrate the enormous numbers of acid-fast bacilli in the tissues. The section is stained in carbol-fuchsin and decolorized in Orth's discharging fluid and then treated with a modified Romanowski stain (Duval).

Fig. 2.—Section of a lymph-node of the rabbit, showing the histological changes that occur after repeated intravenous injections of culture I. Note the similarity of the cellular picture to Hodgkin's disease.

Figs. 3–5.—Illustrate the lesions in the chicken following intravenous and intraperitoneal inoculations of culture I. (*a*) Isolated tubercle in the omentum; (*b*) multiple tubercles in the mesentery; (*c*) large caseating nodule.

Fig. 6.—Sections from the lung of the rabbit inoculated intravenously with culture I. Note the solitary tubercle composed of epithelioid cells and surrounded with a well-defined zone of lymphoid cells.

LA TUBERCULOSIS BOVINA EN CUBA.

ESTUDIO COMPARATIVO DEL BACILO DE ORIGEN HUMANO Y DEL DE ORIGEN BOVINO.

Por Los Dres. J. N. Davalos y J. T. Cartaya,
Havana.

No habiendo observado uno de nosotros (Dr. Dávalos) ningun caso de tuberculosis en el ganado bovino, á pesar de las numerous autopsias practicadas con el fin de estudiar las diversas epizootias reinantes en el país, contrastando éste hecho con la frecuencia de tuberculosos en la especie humana en Cuba, comenzó una investigación minuciosa en las vacas estabuladas en la Ciudad de la Habana. De esta investigación llevada á efecto, en más de ochocientas vacas, pudo comprobar la existencia de la tuberculosis solamente en tres, aislando de ellas el bacilo de Koch.

En la Ciudad de la Habana existen 68 establos con 615 vacas, las que sumadas con 280, que se encuentran estabuladas en vaquerías cercanas á la población, arrojan un total de 895 vacas lecheras. Algunas de éstas vacas muy sospechosas de tuberculosas por los síntomas del aparato respiratorio, fueron sacrificadas, no obstante de no haber reaccionado á la tuberculina, comprobando la autopsia que padecían de bronquitis verminosa (Strongilus micrurus—Strongilus pulmonaris).

Fueron sometidas á la acción de la tuberculina todas las vacas que ofrecían el menor indicio de tuberculosis, no reaccionando más que tres de ellas, las que fueron objeto de las experiencias de que nos ocuparemos dás adelante.

Las informaciones que hemos obtenido de los profesores veterinarios que ejercen en la Habana ó en el campo, y las de los ganaderos están de acuerdo con nuestros resultados. Tambien lo están las que hemos recibido de los inspectores de todos los mataderos de la Isla, en los cuales fueron sacrificados 257,809 bovideos durante el año de 1907.

El médico inspector micrógrafo del matadero, de la Habana, Dr. Ruiz Casabó, nos informa que no ha comprobado ningún caso de tuberculosis en el ganado, á pesar del elevado número de reses que en el matadero han sido sacrificadas y que ascendió al numero de 86,292 durante el año económico de 1907 á 1908.

Es tan rara la tuberculosis del ganado bovino, que algunos de nuestros veterinarios han llegado á negar su existencia en Cuba.

En cambio, las estadísticas de la Ciudad de la Habana demuestran lo frecuente de la tuberculosis en el hombre, según aparece en el siguiente cuadro estadístico de los últimos cinco años.

Anos.	Total de Muertes.	Muertes por Tuberculosis.
1903	5,465	1,027
1904	5,583	1,161
1905	5,832	1,179
1906	6,144	1,153
1907	6,708	1,176
1908 (6 meses)	3,051	600

Siendo tan reducio el número de reses tuberculosas en la Isla de Cuba, es evidente que estos animales desempeñan un papel muy secundario ó nulo en la propagación de la tuberculosis en el hombre. El bacilo encontrado en las tres vacas tuberculosas pertenecía evidentemente al tipo bovino, cuyo germen era de esperar no interveniese en la propagación de la tuberculosis en el hombre. Las investigaciones que emprendimos tenían por objeto aclarar éste punto de patogenia.

Los médicos de la prática civil envian diariamente al Laboratorio del Departmento Nacional de Sanidad un gran número de esputos para el diagnóstico de sus enfermos. Estos esputos proceden, por consiguiente, de los más diseminados lugares de la ciudad y de individuos de todas las clases sociales, edades y sexos. Aprovechamos gran número de éstos esputos, que tratamos por los procederes de coloración descritos por el Dr. C. Spengler. con el fin de diferenciar, por su morfolgía y coloración en el esputo mismo, los dos tipos, humano y bovino del bacilo de la tuberculosis.

Estos procederes de coloración son los siguientes:

Proceder A.—1. Preparación seca en cubre-objeto. Alcalinización con solución de potasa cáustica al 1%.

2. Azul de metileno. Löefler—Lávese con agua.
3. Solución carbol-fuschina de Ziehl. Caliéntese sin hervir. Lávese con agua.
4. Azul de metileno otra vez. Agréguese lentamente una ó dos gotas de una solución acuosa de ácido nítrico al 15%.
5. Lávese con agua, séquese y móntese.

Proceder B.—1. Solución Ziehl al calor sin hervir.

2. Alcohol pícrico 2 ó 3 segundos despues del Ziehl. Agréguese 3 ó 4 gotas de la solución de ácido nítrico y de nuevo la solución pícrica 5 ó 10 segundos. Lávese, séquese y móntese.

Por éstos procederes se destacan intensamente coloreados los bacilos de Koch. Los del tipo humano deben aparecer largos y por lo general aislados ó en pares. Los del tipo bovino aparecen más cortos, á veces en forma irregular y con frecuencia agropados ó en masas.

En más de 100 esputos examinados por nosotros en la forma descrita, encontramos los caracteres morfológicos del tipo humano. En tres casos que los bacilos aparecían irregulares, cortos y agrupados en masas, pudimos comprobar, por la experimentación en el conejo, que se trataba del mismo bacilo tipo humano.

Con disoluciones en agua esterilizada de estos tres esputos, se inyectaron varios cobayas. Cuarenta dias más tarde fueron sacrificados, encontrándose cerca del punto de la inoculación un ganglio muy aumentado de volumen y conteniendo una substancia caseosa. Bazo é hígado aumentados de volumen é invadidos por una tuberculosis miliar. Las preparaciones coloradas evidenciaron el germen inyectado.

Se hacen siembras del ganglio y del bazo en el medio de heuvo de Dorset. Examinadas éstas siembras á los 13 dias, se encontró un bacilo corto é irregular, curvo, estrechado en el centro, con un engrosamiento en una de sus extremidades. En vista de éste resultado, se inyectaron varios conejos: unos subcutaneamente con 0.01 gr. de los bacilos aislados, previamente disueltos en agua esterilizada, y otros con 0.002 gr. intravenosamente. Estos conejos fueron observados durante unos cinco meses, sin que ofrecieran otra novedad que la de un nódulo enquistado que, por algún tiempo, presentaron en el punto de la inoculatión, los que habían sido inyectados subcutaneamente.

De distinto modo se comportaron los conejos que habíamos inyectado con bacilos procedentes de las tres vacas atacadas de tuberculosis bovina. En ellos pudimos comprobar como exactos los resultados señaldaos por el Dr. A. Weber en su artículo "Tuberculosis" del tratado de Wassermann y Kolle. Los conejos inyectados subcutaneamente con 0.01 gr. del bacilo procedente de las tres vacas, murieron tuberculosos en un intervalo de uno y medio á cuatro meses, y los inoculados intravenosamente con 0.002 gr. del mismo bacilo, sucumbieron tuberculosos en el corto periodo de unos 20 días.

Paralelamente con nuestra experimentación en los conejos, se hacían cada día más exhuberantes los cultivos procedentes de los cobayas inyectados con los esputos en el medio de huevo de Dorcet, demostrando al microscopio un bacilo largo, morfologicamente idéntico al bacilo de tipo humano.

Ensanchando la esfera de nuestras investigaciones sobre la tuberculosis bovina en la Isla de Cuba, emprendimos una série de experiencias con objeto de fijar los principales caracteres diferenciales que comprobásemos entre los bacilos tipo humano, y tipo bovino tanto por su morfolgía y modo de comportarse en los medios de cultivo, como por su virulencia para los distintos animales.

Para confirmar la hípotesis de que existen diferencias esenciales y permanentes entre ambos tipos, apelamos á la experimentacíon en conejos y bovídeos como medio de diagnóstico. En los primeros los gérmenes de una

y otra procedencia se comportan siempre como hemos dicho. En los bovídeos las diferencias fueron tambien muy marcadas, requiriendo la experimentación un periodo mucho mas largo de tiempo.

Dos terneras previamente tuberculinizadas, para comprobar que no eran presa de la tuberculosis, fueron sometidas á la siguiente experimentación: A una de ellas, se le inyectó debajo de la piel del cuello $\frac{1}{3}$ de la disolución de un cultivo de 25 días en el medio de huevo de Dorcet, de bacilos procedentes de una de las tres vacas tuberculosas antes citadas. La otra ternera fué tambien inoculada en la misma región con igual cantidad de un cultivo de 25 días en el mismo medio nutritivo, pero el germen procedía de un esputo humano.

A los dos meses de ser inoculada la ternera con el germen bovino, se comprobó un pequeño tumor del tamaño de un huevo de gallina en el punto de la inoculación, á la vez que un ligero infarto de los ganglios del cuello del mismo lado. A los cuatro meses se le inyectó tuberculina ofreciendo una evidente reacción positiva. A los seis meses el tumor y los ganglios del cuello habían aumentado considerablemente de volumen. Se incindió el tumor y dos de los ganglios, apareciendo en ellos una substancia caseosa que, examinada al microscopio, evidenció la presencia del bacilo de Koch. A los once meses fué sacrificada la ternera, comprobándose en la autopsia una tuberculosis generalizada. Los ganglios brónquicos y mesentéricos estaban invadidos, las pleuras ofrecían multitud de tubérculos espariciados en grupos, los vértices de ambos pulmones tuberculizados, el bazo voluminoso y totalmente invadido.

La ternera inoculada con tuberculosis de origen humano sólo presentó un pequeño tumor en el punto de la inyección, sin resentirse los ganglios del cuello. A los doce meses no reaccionó á la tuberculina. Al año y medio fué sacrificada sin hallarse en la autopsia el menor vestigio de tuberculosis. El tumor del cuello adquirió el tamaño de un pequeño huevo de gallina y después de abierto se comprobó que estaba rodeado de un tejido fibroso, á la manera de un quiste, conteniendo una substancia caseosa, homogénea, en la que ni las preparaciones directas ni las siembras pudieron demostrar la presencia del bacilo de Koch: en una palabra, el contenido del tumor era aséptico.

Tambien hemos de consignar que una de las tres vacas tuberculosas que estudiamos, fué adquirida con un ternerito de dos meses, que lactaba de su madre, la cual le transmitió su enfermedad, siendo sacrificado más tarde por ofrecer el síndrome característico de una tuberculosis generalizada, que fué comprobada en la autopsia.

Las siembras del bacilo de uno y otro tipo en agar glicerinado, heuvo de Dorcet, papa glicerinada, caldo glicerinado y suero glicerinado p gelatinizado no se comportaron de igual manera: las del tipo humano se desarrollaron con más rapidez y exhuberancia que las del tipo bovino.

En las siembras de ambos gérmenes en caldo glicerinado, con una acidez de 2%, comprobamos que el bacilo tipo humano germinaba con facilidad, contrastando con la germinación tardía y ténue del bacilo tipo bovino.

Un caracter distintivo de ambos bacilos, que entendemos merece ser consignado, por haberlo observado constantemente en nuestras experiencias, consiste en la facilidad con que se disuelven en solución salina las colonias del tipo bovino, mientras que la disolución en el mismo medio de las colonias del tipo, humano se consigue con dificultad.

Respecto á la morfología de ambos bacilos, hemos de consignar que en las primeras generaciones en los medios de cultivo ambos gérmenes aparecen cortos, de una longitud doble á su diámetro, adquiriendo después una mayor longitud, que se acentúa más en el humano que en el bovino.

De las investigaciones antedichas se deduce:

1. Que es rara la tuberculosis bovina en Cuba.
2. Que existen diferencias positivas entre el bacilo tipo humano y tipo bovino.
3. Que la tuberculosis observada en el ganado vacuno, es debida al bacilo tipo bovino.
4. Que en Cuba no se ha comprobado el origen bovino de la tuberculosis humana.

THE INTERTRANSMISSIBILITY OF TUBERCULOSIS.

By Charles F. Dawson, M.D., D.V.S.,
Delaware College Experiment Station, Newark, Delaware, U. S. A.

Since the researches of Dr.Theobald Smith in 1896 and 1898 on the biology, morphology, and pathogenesis of bovine and of human tubercle bacilli, the study of the intertransmissibility of tuberculosis has assumed great importance.

Following the work of Smith came the now famous declarations of Koch, denying the unity of human and bovine tuberculosis, and also doubting that they are intertransmissible.

The scientific world was at once moved to take notice of these statements, and commissions were appointed to investigate the correctness of Koch's assertions. If the Koch idea could be shown to be well founded, it was evident that sanitary measures restricting the sale and movement of tuberculous animals and their products were unnecessary, and that they were harmful to the cattle industry. More important still was the probable removal of apprehension concerning the influence of diseased animals and their products upon the public health.

It has now been about seven years since Professor Koch first agitated the question of the intertransmissibility of tuberculosis in a memorable address before the British Congress on Tuberculosis.

A summation of the views of various authors shows a preponderance of opinion against Koch's theory. Indeed, it would seem that while Koch's statements have generally failed to create converts to his theories, they have served to call the attention of the whole professional and lay world as well to the great prevalence of cattle tuberculosis, and to the question of its transmission to man. Therefore the agitation has been productive of an immense amount of good, and has served to interest our lawmakers, who, heretofore, have generally regarded the question with suspicion, and those who agitated it as faddists. Of equal importance has been the effect of Koch's statements upon the scientific world. Coming, as they did, from such an eminent authority on tuberculosis, pathologists at once began to investigate tuberculosis with renewed vigor and from every conceivable standpoint. So that to-day this terrible scourge of man and of our principal meat-producing animals is receiving the attention from pathologists that its tremendous importance demands.

It is admitted by all authorities that bovine tuberculosis is rapidly increasing in extent in civilized countries. In the United States it is impossible at present to present accurate statistics, owing to more or less laxity in the enforcement or absence of law for protecting the health of persons and of animals. Enough is known, however, to cause us to view with alarm the probable effect upon the public health by the disease if it is allowed to continue its ravages. Statistics seldom give a correct idea of the prevalence of diseases. This is particularly true of the statistics of tests for tuberculosis in the United States, for the reason that the tests are generally made in herds where there is reason to suspect the disease is present. Were all cattle tested indiscriminately, it is probable that the percentage of cases would be materially reduced. In Massachusetts, where 24,685 cattle in suspected herds were tested, 12,443, or 50 per cent., were found tuberculous. In the same State, 4093 cattle in non-suspected herds furnished 1080 reactors, or showed only 26.4 per cent. tuberculous animals. In experiment station tests in suspected herds 115 out of the 323 head that were tested proved tuberculous—a percentage of 35.6. In non-suspected herds 84 out of 935 head proved tuberculous, or only 9 per cent.

At present the disease is confined largely to dairy cattle, as is shown in our Federal statistics for the year 1900, in which nearly 5,000,000 inspected carcasses of beef animals showed only about 0.11 per cent. tuberculous.

Statistics also show that the disease prevails in swine in proportion as they come in contact with infected cattle. In fact, swine tuberculosis is now taking high rank as the most important swine disease which may affect the public health. In swine the disease is usually generalized, and thus more edible portions of the carcass consumed, and the chances of infection are to this extent increased. Porcine tuberculosis is found most prevalent in hogs fed on dairy refuse from infected dairy cattle, and where they have access to cattle manure. That swine readily contract tuberculosis from the ingestion of artificially infected milk, from feeding behind cattle affected with natural tuberculosis, from feeding behind cattle affected with tuberculosis by drinking artificially infected water, and by the subcutaneous injection of virulent tubercle bacilli, has been demonstrated by Schroeder and Mohler, of the Bureau of Animal Industry. The same authors demonstrate that the feces of a tuberculous cow are more certainly infectious than her milk. This is true because the lungs are more often the seat of the disease than is the udder, and because it has been shown that tubercle bacilli are swallowed by cattle instead of being coughed up and expectorated, and that they pass through the bovine digestive canal and are discharged with the feces without having lost their original virulence.

We are thus brought face to face with the fact that when a cow's lungs are sufficiently involved to cause her to discharge tuberculosis bacilli, she be-

comes a disseminator of tuberculosis, regardless of the question of her udder being diseased. The fact that there is extreme care, as regards cleanliness, in milking operations about such animals is no guarantee that the milk is free from tubercle bacilli.

Not only is the public health menaced by the presence of tubercle bacilli in fresh dairy products in which they retain all their original virulence, but it has been shown by several investigators that tubercle bacilli live and retain their virulence for several months in ordinary butter. The writer conducted an experiment in which it was shown that tubercle bacilli retain their original virulence in ordinary butter for a period of three months, and even after a period of eight months the same butter was capable of producing the disease in guinea-pigs.

We thus see that one cow in a herd may affect her calf by the bacillus-laden manure which soils her teats and adjacent parts; that this manure may infect the milk; that her milk, when added to the milk of perfectly healthy cows, will infect the whole supply from that herd.

Schroeder has shown that it requires only a single nursing of a tuberculous mother-cow to infect her offspring. He allowed three sucking calves to nurse a tuberculous cow one, three, and seven days respectively. A fourth calf was fed the milk from a pail for thirty days. All other sources of infection were excluded. All four calves contracted tuberculosis.

A single tuberculous cow that is passing the bacilli in her feces will infect a whole stable sooner or later. Her manure, mixed with that of healthy individuals, will infect the whole manure pile, and this, if swine have access to it, will become infectious for them.

If, as Koch claims, man cannot contract tuberculosis from the lower animals, our interest in the matter, outside the question of the palatability of tuberculous meats and dairy products, would be confined largely to the inconveniences of a restricted diet and of financial losses. However, the preponderance of evidence favors the view that all forms of tuberculosis, from that found in man, even to that found in cold-blooded animals, are identical. That the variant types of tubercle bacilli are the product of environment receives confirmation from our laboratory experiences with the pathogenic bacteria, which all workers know show variations in morphology, biological properties, and pathogenesis, according to the medium, age of culture, passage through various animals, and other environmental influences of which we are probably now ignorant.

Already a large amount of work has been done which shows that tuberculosis is an intercommunicable disease. It is admitted that the human bacillus is less virulent for the animals than is the bovine bacillus. This was shown by Sidney Martin as far back as 1895, and has since been demonstrated by others. While these observations are of scientific value, they can be

explained in the light of our knowledge to-day. We now know that the virulence and morphology of a particular type can be changed at will.

Nocard, in 1898, transformed human bacilli which ordinarily were non-pathogenic for fowls into a pathogenic avian type by successive cultivations in collodion sacs in the peritoneal cavity of fowls.

Delépine found great variation in the virulence of human bacilli, and by using a mixture of human sputa, easily produced tuberculosis in a calf, cultures from which showed a great increase of virulence over the original bacilli.

Römer passed an old laboratory culture of human bacilli through a goat, which animal is somewhat resistant to tuberculosis, and found that the bacilli were exalted in virulence for cattle and sheep. Not only was the virulence increased, but there were morphological changes toward the bovine type, and it grew less luxuriantly on artificial media. He also transformed the avian type into the mammalian type by passage through guinea-pigs and rabbits, to the extent that the lesions produced were similar to those produced by the mammalian type. He also revived the artificial cultural capacity of different types by passages through white mice.

Moeller found that a single passage of the human type through a guinea-pig exalted it in virulence for guinea-pigs.

Dinwiddie was able to transform the bovine type to the porcine type by passage through swine. These changed characters persisted in subsequent cultures and inoculations.

Wiener isolated a human type from a horse which was virulent for fowls. Collodion-sac cultivations in the bodies of fowls changed the type from human to avian.

Karlinski found that the virulence of human bacilli can be increased by passages through guinea-pigs or cattle to a point where they produce generalized tuberculosis in cattle, and where they do not differ materially from the bovine types.

Mohler and Washburn, by the rapid passage of sputum bacilli through a series of five cats, report a great increase in their virulence for young cattle.

Dieudonné, by the repeated passage of mammalian bacilli through frogs, observed a gradual increase of virulence for cold-blooded animals and an approach to the type found in fishes and frogs.

Arloing found that human sputum bacilli vary in virulence from one extreme, where they readily produce generalized tuberculosis in guinea-pigs and rabbits, to the other extreme, where they are harmless to rabbits and but slightly affect guinea-pigs. The virulence of the weak variety could be exalted so as to readily affect guinea-pigs and rabbits by passage through two or three guinea-pigs.

It will be seen from the foregoing that tuberculosis affects a wide range of

species of animals, and that the bacillus undergoes very important changes according to environment. The bovine type is pathogenic for horses, cattle, sheep, swine, dogs, cats, guinea-pigs, and rabbits, a range of pathogenic power that is not possessed by any other microörganism that is not also pathogenic for man.

From the nature of things we cannot, by experimental data, such as the foregoing, prove the communicability of animal tuberculosis to man, but sufficient evidence is at hand to convince us that man does contract tuberculosis by contact with and by the use of the edible products of tuberculous cattle.

Salmon, in Bulletin No. 33, Bureau of Animal Industry, cites the following cases which show clearly the danger from this source confronting the human race: Three cases of skin tuberculosis due to accidental inoculation with the bovine bacillus. Veterinarian Moses wounded his thumb while making an autopsy on a tuberculous cow. The wound healed, but at the end of six months a cutaneous tubercle had formed, and the patient died of phthisis in eighteen months. A man engaged in cleaning a cattle car was wounded upon the back of the hand by a piece of the broken woodwork of the car. Tuberculosis developed at the wounded surface and was treated by a physician. The patient's health declined and he died of generalized tuberculosis within a year.

A physician was called to treat a six-year-old girl for supposed ivy poisoning. Fresh cream had been applied to the affected parts at home. Tuberculous ulcers developed where the cream had been used topically. Two rabbits, inoculated with some milk from the same cow, developed tuberculosis. Likewise, a rabbit inoculated intraperitoneally with caseous material from the girl's leg developed fatal tuberculosis.

A similar case was where a girl, who had a wound on the finger, became infected by milking a tuberculous cow. Within six months more than sixty subcutaneous abscesses developed in various parts of the body. The nature of these lesions was determined by the inoculation of a rabbit.

A sailor tried to remove tattoos from his arm by pricking milk into the marks with a needle. Lupus developed, and the man made a recovery after surgical measures were taken.

These cases show as plainly as an experiment well could that bovine tuberculosis can be communicated to man in a fatal form by subcutaneous inoculation.

That bovine tuberculosis is communicated to man by the ingestion of the products of tuberculous cattle is just as plainly shown by the following cases, also cited by Salmon:

Twelve girls, at a boarding-school, contracted tuberculosis, and five of them died of the intestinal form of the disease. An examination of the cow

which furnished the school with milk revealed extensive tuberculosis of the intestines and udder.

The daughter of a physician was accustomed to visit her father's farm on Sundays, and while there, to drink freely of milk. She became ill and died in ten months. A post-mortem examination revealed tuberculosis of the abdominal viscera and mesenteric glands. On examination of the herd, four of the five cows comprising it were found tuberculous, two having disease of the udder.

A child twenty months old died from abdominal tuberculosis three months after having visited its uncle's farm, where it was fed milk from the family cow. The child's sickness began a few weeks after its return home. It had previously been in perfect health, as were also its parents. When the cow was examined, she was found to have generalized tuberculosis.

Two young daughters of a healthy family were raised on milk from a tuberculous herd, and both contracted tuberculosis, while two older brothers, who used little or no milk, remained well.

A previously healthy man was treated for six weeks for supposed typhoid fever. As the expected convalescence did not occur, a consultation was had, and a diagnosis of acute miliary tuberculosis was made. Shortly after, the man's one-year-old child came down with meningitis of supposed tubercular origin, no post-mortem being permitted. Both parent and child had drunk largely of milk from a cow which a subsequent test and examination showed had extensive tuberculosis of the lungs, peritoneum, and udder.

These cases could be extended in number, but are sufficient to show, beyond a reasonable doubt, that the disease can be communicated from cattle to man through the use of the products of tuberculous cattle and by subcutaneous inoculation.

At the conclusion of the Joint Session arrangements were made for the continuation of the discussion on the following morning. The Joint Session of Sections I and VII was therefore concluded on Thursday morning at the New Willard Hotel, Dr. H. M. Biggs presiding, in the absence of Dr. Pearson and Dr. Welch, whose duties required them to conduct the regular programs of their respective Sections. The report of the conference at the New Willard Hotel follows.

The Conference on the Relations of Tuberculosis of Animals and of Man,

At the New Willard Hotel, Washington, D. C.,

Thursday, October 1, 1908;

CONTINUING THE JOINT SESSION OF SECTION I AND SECTION VII.
(In Camera.)

The participants in the discussion at the Joint Session of Sections I and VII met at 9 o'clock on Thursday morning, October 1st, in the New Willard Hotel. The presidents of Section I and Section VII being absent on account of the regular Section meetings, Dr. Herman M. Biggs was asked to preside. It was understood that the proceedings of this conference were part of the proceedings of the Congress, in the Joint Session of Sections I and VII.

Verbatim notes were taken by Mr. Whitman, the official stenographer of the American Medical Association. The following report is derived in part from the account published in the "Journal of the American Medical Association" (October 10, 1908) and in part from the later account published in "Tuberculosis" (November, 1908) over the editorial signature of Professor G. Pannwitz, Secretary-General of the International Antituberculosis Association.

Dr. Biggs called the meeting to order at 9 o'clock.

Dr. Herman M. Biggs (New York): It is understood by all of you that this conference was arranged at the suggestion of Professor Koch, for the purpose of discussing somewhat informally and privately the questions of the connection between human and bovine tuberculosis which are of such enormous theoretical and practical importance; and it is the understanding that what is said here is simply for the information of those who are interested in this work and in the bacteriological problems involved. I hope all those who are present will keep this in mind.

I will now ask Professor Koch to open the discussion.

Prof. Koch: A great difference of views seems to prevail with regard to the question of human and bovine tuberculosis, and I am glad that we have

an occasion to enter into the subject in detail. I trust we may be able to prepare an understanding in the matter, although I do not believe that perfect agreement of the various views will be obtainable, as each author, having taken much time to build up his opinion, will be inclined to cling to it until his life's end. What mostly impedes an understanding is the difference of languages, and the necessity to translate the remarks of the various speakers into several languages, so that a possibility of incorrect interpretation can arise. I would, therefore, urgently beg the various gentlemen to make their remarks as concise as possible, and to keep strictly to the subject without any superfluous additions.

I would specially propose two points for discussion, the first referring to the remarks of Mr. Fibiger, who contends that bovine tuberculosis is very frequent in man. I wish to state again on this occasion that I have never denied that bovine tuberculosis is found in man, but I contend that these cases are rare. Secondly, I would refer to the statement I made on Wednesday last in the Congress, to the effect that not one single authentic case of phthisis has ever been found in man where for any long period of time bovine tubercle bacilli have been coughed out by the patient. I would specially ask the question whether any case of pulmonary tuberculosis exists in which tubercle bacilli of the bovine type were found, not once, but repeatedly.

I propose that we should discuss this second point first, and I ask: Has any one of the gentlemen present ever seen such a case of bovine tuberculosis in man? [Pause.] It appears that nobody knows of such a case. The German Commission for research—that much is known to the members present—found no such case among 22 cases investigated. As regards the work of the British Commission, I may mention the fact that one of the animals became infected with bovine tuberculosis after being fed with human sputum, but that this case cannot be given weight as proof. Moreover, it appears that in these experiments a large number of sputa, obtained from a plurality of patients, have been given. Perhaps Dr. Woodhead may be in a position to furnish full information on the subject and make definite statements on the series of experiments. A number of experiments with sputum collected from many consumptives have been made, in which the results were negative.

THE CHAIRMAN: Is there any one here who can report such a case as Professor Koch has asked for?

PROF. S. ARLOING (Lyons, France): I claim to have identified such a case, or discovered such a case in which the bovine bacillus was isolated. An autopsy was performed, and in a cavity the tubercle bacillus was found, and a culture made from it which possessed all the cultural characteristics of the bovine tubercle bacillus, and which, when injected into an animal of the bovine species, produced a generalized tuberculosis.

PROF. KOCH: The case on which Professor Arloing reports and his conten-

tions are known to me, but the finding of a single case of bovine tuberculosis in a cavity cannot be considered as proof; the case would only show proof if the bovine tubercle bacillus had been found repeatedly and during a certain period of time. In this connection I would call attention to the possibility of accidental contamination with milk or butter or other food substances, which must always be kept in view; even if the bovine tubercle bacilli are found in a cavity after death, the possibility must always be thought of that the patient, in the course of his last hours of life, may have inhaled particles of vomited contents of the stomach or contents of the mouth cavity, and that the infection of a tuberculous cavity with the bovine type may have come to pass in that way. One isolated observation of this kind has not the necessary power of proof, and only experiments of utmost exactness, and excluding every possibility of secondary contamination, can be taken into account.

THE CHAIRMAN: I will now call on Professor Woodhead to say a few words.

PROF. G. SIMS WOODHEAD (Cambridge, England): I quite agree with His Excellency, Professor Koch, that it may be well for us to keep to one or two points. From my point of view, it is somewhat unfortunate that the second point should have come up for consideration first. I say that because I am not in a position to say very much about the second part, as we have in our second interim report published only that part of our investigations, as regards the bovine type of bacillus, which deal with alimentary tuberculosis or tuberculosis associated in some way or other with the alimentary tract. I quite admit that Professor Koch's criticism as regards that single experiment or a small group of experiments must carry some weight. I may say that the first experiments made by us were carried out for a considerable length of time, as we intended to feed for such a long period, and we started at once with material which perhaps now we should scarcely accept, but it was material that was taken from the Brompton Hospital for Consumptives. It was strongly impressed on those who had charge of the collection of this material that it should be as pure as possible, and all possible precautions that could be taken as regards this sputum were taken. It was not a single specimen of sputum. The sputa came from different sources, from selected cases, and therefore we do not lay any very great stress—and I think Professor Koch will bear me out in this— on these cases. They gave, as it were, an indication of what we might expect to find. There is included in the appendix of our report every single experiment that has been made. We have kept nothing back. We have given all details, and we would like those who do not agree with our findings to examine the data on which those findings were arrived at. Therefore, I do not feel in a position to say very much about the question of the typus bovinus in the lung. At the same time, I can assure you it is a question that has not been overlooked, and I can also, I

think, assure Professor Koch that the conditions or requirements he laid down have been and are being carefully attended to. We have gone into this matter in as absolutely an impartial state of mind as is possible for five men of somewhat different opinions to do. We have received the assistance of very able men, who have looked at this thing from different standpoints. Dr. Eastwood, Dr. Corbett, and Dr. Griffith have undertaken a detailed investigation. They have all of them naturally acquired a very great amount of experience in this kind of work. They are fully impressed with the practical points laid down by Professor Koch, and whatever our results may be, I can assure you they have been arrived at by taking into consideration the work of others and comparing it with the work that is being done on our farms. We cannot do any great amount of clinical work; that has been impossible, as other work has been so important, and when we come to the discussion of the first point that has been suggested, I shall have something to say. But I cannot claim that we have done any special work that we can publish at present. We cannot claim that we have found any case except the one referred to by Professor Koch. As he has pointed out, there are certain criticisms which are perfectly legitimate, and we do not wish to lay stress on that aspect of the question at all; at the same time, I think it only fair that I should mention what is being done, and that we have not lost sight of the point.

Prof. S. Arloing: I know that Professor Koch accepts the reality of the finding of a large number of bovine bacilli in the lung, but he believes that this may have occurred by contamination from food. I wish to say that this patient was for a long time in a hospital where the bovine type of bacillus should be a rarity, and if contamination took place through the food, such contamination must have been by means of a dried bacillus. But the anatomical contents of the cavity examined, namely, in the lung, showed the presence of virulent bovine bacilli in great numbers, so that the finding of the bovine type of bacillus in very great numbers in the lung would show, at least, that human tissue is a suitable culture-medium for the bacillus of the bovine type.

Prof. Koch: There seems to be a misunderstanding between Professor Arloing and myself. I do not doubt that he has found the bacilli of the bovine type in the lung, but this is only an isolated case. I repeat that we may be dealing here with an accidental admixture.

Prof. S. Arloing: I admit that my researches were not strictly in conformity with all the requirements of Professor Koch,—that is, constant and prolonged research in this matter,—but these bacilli were found during the life of the patient, and, therefore, precluded the supposition of Professor Koch that the occurrence of this infection was at a moment of agony. I wish to repeat that the multiplication of these bacilli in the tissue shows adaptability of human tissue to the bovine bacillus.

PROF. THEOBALD SMITH (Boston): The question before us is one of methods. In the study of the tubercle bacillus with special reference to its differential characters we would hardly apply the same methods to-day which we applied ten or fifteen years ago. Now we must determine not only whether the bacilli associated with a certain disease are bovine or human, but we must guard against being deceived by mixed cultures or by the accidental presence of one or the other type. I think the demand made by Professor Koch a reasonable one. In the final determination of bovine tubercle bacilli as a cause of pulmonary tuberculosis there should be repeated examinations of the same case, to find out whether the bovine bacilli actually multiply there and continue to be thrown off in sputum. Unfortunately, I am not familiar with the details of the original paper by Professor Arloing, and I am, therefore, unable to make any comments on it which may have any weight. However, in a problem of such importance as this, where the existing evidence may be made to point both ways, we must begin over again in the collection of scientific evidence. What has been reported thus far can only be considered presumptive. The presence of large numbers of bacilli in the lungs, in the case mentioned by Professor Arloing, cannot be safely used as an argument, because they may have been human bacilli admixed with a few bovine by accident, as Professor Koch points out. We know that there are human bacilli of such low virulence toward guinea-pigs that they may be lost after inoculation and only the virulent bovine type persist. Finally, the difficulties and pitfalls surrounding the bacteriological study of diseased organs in open communication with the air and the digestive tract are well known. The study of lymph-nodes presents fewer difficulties.

DR. LEONARD PEARSON (Philadelphia): It occurs to me, from the remarks of Professor Smith, it may not be clear that this organism which Professor Arloing discovered in the lung of man was proved by him to be virulent for cattle. It was not a non-virulent organism in the lung, and was, according to his understanding, of the bovine type.

DR. RAVENEL: Am I right or wrong in understanding that the German Commission has ascertained the bovine type of the bacillus to be the cause of a case of miliary tuberculosis of the lungs?

PROF. KOCH: I have asked whether any case exists of tubercle bacilli of the bovine type in pulmonary tuberculosis, and not in miliary tuberculosis.

DR. RAVENEL: Am I right or wrong in saying that the German Commission has published a case of that kind?

PROF. BANG: I think you are right.

DR. T. SMITH: These are two quite different things. Generalized tuberculosis can cause death long before any tubercle bacilli are ripe for colonization in a case of pulmonary tuberculosis.

DR. RAVENEL: That may be correct; but is not acute miliary tuberculosis of the lungs phthisis?

PROF. KOCH: No, it is not.

PROF. FIBIGER: I would ask whether Professor Koch remembers an authentic case of bovine tuberculosis in man which is described by Dutch authors.

PROF. KOCH: I know that case very well. It is a case of this type; but it has the defects which have been inherent in the earlier investigations. Besides, the same objections apply to this case as to that mentioned by Professor Arloing, viz., that the case represents but one single finding. In order to arrive at definite conclusions, the greatest care with reference to the conditions stipulated by me must be taken in future in all cases investigated and reported. I do not consider this question as settled either in one sense or in the other, before all inexact cases which are unsuitable for proof are absolutely cleared up.

THE CHAIRMAN: Unless there is objection, we will now pass on to the consideration of the second question, and I will ask Professor Koch to speak.

PROF. KOCH: I would ask the following question: How often does primary intestinal tuberculosis or tuberculosis of the mesenteric glands occur in children? It has been said by some that primary intestinal tuberculosis occurring in children is due to bacilli of bovine tuberculosis. I contend that this form of tuberculosis is not frequent, and in support of this assertion I refer to Virchow, Orth, Albrecht, Baumgarten, and others as authorities who have said, and still say, that primary intestinal tuberculosis is an extraordinarily rare disease. [Professor Koch read the following passage from the newest work of C. Flügge, "Die Verbreitungsweise und Bekämpfung der Tuberkulose auf Grund experimentaler Untersuchungen im hygienischen Institut der Königl. Universität Breslau"—"The Experimental Researches Carried Out at the Hygienic Institute of the Royal University of Breslau," 1908, p. 411.]

"If some few authors are of a different view, and Fibiger and Jensen, for instance, find primary intestinal tuberculosis in the case of about 6 per cent. of all patients and of about 11 per cent. of all tuberculous patients, and in children even of 16 per cent., Baumgarten considers this figure 'as far too high,' and says: 'Primary intestinal infection is very rare, according to my experience, and most pathological anatomists agree with this view.' Virchow, Orth, Ribbert, Albrecht, and many others have expressed their opinions to quite the same effect. Orth found among 131 children only 1.5 per cent. of unquestionable tuberculosis of the intestinal and mesenteric glands; Biedert, among 3104 sections of tuberculous children, found primary intestinal tuberculosis 16 times, *i. e.*, 5 cases in 1000. Baginsky found no case in 933, Grosser only one case among 1407 sections of tuberculosis in the Pathologic Institute of Tübingen."

Thus it is seen that the views of the pathologic anatomists widely differ

from each other. I have discussed the question with Orth among others; his personal view certainly differs from that of Heller's assistants, as far as autopsies in Berlin are concerned.

I would now ask: Whence comes this great difference? Are there local differences in the pathological material of the various localities, or must the difference of opinion be looked for in the subjective understanding or subjective interpretation on the part of the various prosectors and pathological anatomists who carry out the autopsies? This question remains undecided. The question of the frequency of primary intestinal tuberculosis I consider settled thus far, that, in my opinion and in that of other authorities, the occurrence is very rare. If we consider that eleven-twelfths of the tuberculous deaths are due to pulmonary tuberculosis and only one-twelfth is caused by all the other forms of tuberculosis together; if we take into account that, of these again, only a small part can be due to primary intestinal tuberculosis, and that, once more, only a small part of them belongs to bovine infection, we must admit that bovine infection is a rare clinical occurrence.

PROF. WOODHEAD: I must say that when Professor Koch stated in London that primary feeding tuberculosis was very rare and actually seldom or never occurred——

PROF. KOCH: I said it was rare.

PROF. WOODHEAD: While at Edinburgh, as pathologist, I made a great number of post-mortem examinations, and I have taken the different records, before this question came to the front so prominently (it was back in the '80's), of some 119 cases, and have come to the conclusion that 14 per cent. of these were due to alimentary tuberculosis. It first made me think that this might be the result of alimentation and the conditions in that city. I went into the question, and I found what appeared to be confirmatory evidence on this point, that no child up to one year of age became affected, but immediately after there was a sudden rise in the number of cases. This, of course, is ancient history, but it certainly was a very striking fact to hear that in Germany so few of these cases occurred. A commission was appointed, as you will remember, and we examined 60 cases of tuberculosis of human origin; that is, the material taken from 60 cases. You will remember that we divided the bacilli from these cases into two groups, with a third undifferentiated group. We have not fully made up our minds as to this third group, but we have undoubtedly two very different groups of bacilli, and we have arrived at the same conclusion as Professor Kossel has, namely, that these must be looked on not as distinct species, but we must take them provisionally as types. We separated 14 cases, which were undoubtedly virulent, from the bovine species. They appear to have the specific characters of the bovine type of bacillus. We found ten of these were taken from cases in which there were primary lesions, and you may be assured that we are very careful in our

selection and description of these cases. They were primary lesions of the abdominal tract. At any rate, we put them down, according to the evidence we had, as being cases of abdominal tuberculosis; so that we have ten cases in children from which we were able to separate a special type of bacillus. It was undoubtedly a virulent organism when tried on cattle and rabbits, and it had the general characters. We do not lay quite so much stress on the differential characters as many appear to do, because we find they are sometimes unreliable. We have found also three cases of tuberculosis of cervical glands similar to those described, in which we got the same results. These were to a certain extent selected cases, and after what we have heard you may imagine we were very anxious to get a number of these cases of abdominal tuberculosis. We have found since that we had no need of extensive search, since a considerably larger number of cases have been submitted to us than we had any idea of. So far as our experience goes, this form of abdominal tuberculosis is not by any means so rare as stated in the statistics cited by Professor Koch. Whether these people are biased or not (and we are all biased sometimes), I think that you will agree with me that five or eight people working together, in a scientific study, are not likely, in a doubtful matter, to be practically unanimous, as we have been in all these cases. We regard them as cases of primary abdominal tuberculosis. If eight people looking at the question from somewhat different standpoints differ, then they must be excluded as being of the abdominal type. In connection with these cases—and I should like you to pay special attention to this—we not only used mesenteric glands, but we used lesions at a distance and obtained the same results. When we examined any lesions at some slight distance from the mesenteric glands, we took not only the mesenteric glands, but anything we encountered in the immediate neighborhood which could be associated with these, and might not be associated with tuberculosis in any other parts of the body. You will understand, therefore, that we feel we have considerable evidence on this point. We have separated the bacillus of the bovine type from the human. We have had, in addition to those cases, 40 other cases of different kinds. I mention them in order that the opposite side may be estimated. We do not look upon these as of a virulent type; although, in calves, the bacillus gave a generalized progressive tuberculosis. I cannot give the particulars of the cases of tuberculosis of the cervical glands. We had eight mesenteric cases, ten in the lungs or bronchial glands, one case of tuberculosis of the kidney, one of tuberculosis of the testis, and nine cases of tuberculosis of the bones and joints. Our experience teaches that we cannot neglect this form of tuberculosis.

In connection with the prevalence of the disease, we have come to the conclusion that the bovine infections form a definite, and, therefore, important class of cases. No one for a moment can say that they are as important as

tuberculosis of the lung. But Professor Koch has pointed out that he considered the solution of this question so important that he is going to give his attention for some time to come toward solving it; that he is going to work to find out whether the bovine type of bacillus has anything to do with tuberculosis of the lung. We are delighted to hear that, because we know if he does undertake this work we will get some results. I cannot help believing that if Professor Koch had had the special experience in our country that we have had, he would, this morning, have taken a somewhat different view as to the importance of this general question. I would ask him, in view of the fact that these results vary so; in view of the fact that we have these differences of opinion as to the portal of entrance; in view of the fact that we are all making an effort to eliminate tuberculosis not only from the human race, but from animals also, how we can get rid of this disease? We are glad to know that he agrees with us, that we cannot get rid of it unless we get rid of it in cattle, and I would ask whether it is not worth while combining, until these points are settled, on some definite legislation, or, at any rate, not discouraging legislation which will help us to get rid of tuberculosis, not only in the form of phthisis of man, but also in the bovines. We know from experience that the amount of bovine tuberculosis will go on at an increasingly rapid rate unless we can adopt measures to curtail it.

In view of this great difference of opinion, and in view of the fact that Professor Koch is going to work on this subject,one cannot express very positive conviction at this time; but I hope that those of us who believe in the infectivity of bovine tuberculosis will consider it far preferable that we should do something that will certainly not harm the human family, rather than leave something undone which may allow harm to fall upon man.

Dr. A. Calmette: The requirements of Professor Koch are too stringent to allow definite solution of this question. The experiments made of infecting the aërial route of animals by inhalation of infected dust indicate well-known types of pulmonary infection, whether the bovine or the human bacillus be used as the infecting agent. However, in my opinion infection by the digestive route is by far the most important and most frequent. I admit, with many observers, that the bovine bacillus infects the mesenteric glands, for the reason that it has been taken from these glands, cultures made, and found to be the bovine bacillus. However, retention of the bovine bacillus in the mesenteric glands of young children or animals is of rare occurrence. Ordinarily such bacilli penetrate further into the organism and, becoming localized in pulmonary organs, by reason of their development, undergo a change in their morphological and biological characteristics and can assume the human type. This transformation, like those of different microörganisms in different animals, is brought about by prolonged sojourn in each species of animals, the bovine bacillus in chronic tuberculosis of lungs in man being

transformed into the human type, and frequently this infection has occurred in the mesenteric glands of children, thus permitting of finding the bovine tubercle bacillus there. The hog is equally susceptible to infection by the bovine type of bacillus or by that of the human type, and inasmuch as polymorphism is so well established in bacteriology, why should it be denied a place in the consideration of the tubercle bacillus?

PROF. TENDELOO: I have examined more than 1200 bodies for the existence of tuberculous foci anywhere in the body, and I have come to the conclusion that primary mesenteric tuberculosis is exceedingly rare. A great deal depends on the method of examination that is adopted, especially the examination of the lymphatic apparatus, particularly the lymph-glands in the lung. Unless the lung is carefully examined, according to the method I will presently describe, small tuberculous foci frequently escape detection. As a preliminary step, I always palpate the whole surface of the lung very carefully for the sensation of small caseating foci, or even of small cavities, imparted to the fingers, which is much more reliable than purely visual macroscopical evidence. After this is done, the lungs are cut with the usual two incisions, and after the pieces are again examined by palpation the whole lung is cut into small pieces and each portion carefully examined. In this way one will be surprised very frequently to find small tuberculous areas that would otherwise surely have escaped detection. If all the cases in which small foci found in the lungs are ruled out as doubtful in regard to a primary mesenteric infection, not to say probably secondary, then only a small number of cases of distinctly primary intestinal tuberculosis will be found.

I want to say a few words in regard to the claim advanced by Professor Calmette, that (bovine) tubercle bacilli may remain in the mesenteric glands without producing any local changes, and may then wander on to the lungs beyond, producing tuberculous lesions in these organs. I do not believe that this is possible. My main argument against this conception is the experiments of Cornet, which, peculiar to say, are not quoted as often as they should be, especially by those who have only made a few animal experiments as compared with the more than 3000 animal experiments that Cornet undertook. Other researches have confirmed these results. This work is not appreciated enough and is frequently unduly criticized by those least competent to do so. Cornet established the point beyond peradventure that wherever tubercle bacilli are introduced into the body, they either produce a strictly localized tuberculosis, or the tuberculosis involves the regional lymph-glands surrounding the area of infection. It makes no difference into what part of the body the tubercle bacilli are introduced, into the paw, the tail, or the intestinal tract, apart from intravascular inoculation. On the basis of these experiments, it is exceedingly difficult to understand how the organism of bovine tuberculosis should remain in the

mesenteric glands without producing any changes in these tissues, and then cause a tuberculosis in remote organs. The experiments of Calmette, it seems to me, do not sufficiently support his hypothesis. So far as they are clear, the results of post-mortem examination on human bodies wholly agree with the experimental results of Cornet.

PROF. J. FIBIGER (Copenhagen): I still maintain that, according to the statements of the Gesundheitsamt, the English Commission, and of Jensen and myself, there is a considerable number of cases of bovine infection in children, especially in intestinal and cervical tuberculosis occurring in children. Opinions vary greatly in regard to the frequency of primary intestinal tuberculosis, but the tendency seems to be more and more toward discovering that these cases are much more frequent than they were formerly believed to be. Dr. Koch has quoted a number of pathological anatomists, and I will refer to the same authorities, referring chiefly to the results they have published in the last few years, whereas Professor Koch refers to their figures at an earlier period. [Professor Fibiger then gave many statistical data, referring to the contributions of Baginski, Hansemann, Benda, Orth, the English statistics of Kingsford, the statistics of Nebelthan, Lubarsch, Harbitz and his own cases, most of them showing a marked increase in the number of cases of primary intestinal tuberculosis occurring in children and reported within the last few years.]

It is quite apparent that there is in this direction a great diversity of opinion, and just how to explain the different figures is difficult. It is possible that differences in the methods of nutrition in different localities can be held responsible, in some places the milk being boiled, in others not, etc. There is no doubt in my mind, if I may repeat what I said before, that primary intestinal tuberculosis in children is a frequent disease. According to the summary of the figures published in the last few years from some hospitals in Kiel, Berlin, and Copenhagen, nearly every sixth or seventh child that is examined post mortem in these hospitals has primary mesenteric tuberculosis. If, now, every sixth child is affected in this way of all children examined, and if about a third of these cases are due to infection with the bovine bacillus, which I assume is probable, then about every eighteenth child that is examined on the autopsy table is affected with primary bovine intestinal tuberculosis; in other words, about 5 per cent. of all the children that come to autopsy. Professor Koch claims that the number of cases is small. If 5 per cent. of all dead children is not a big figure, what is a big figure?

PROF. KOCH: Notwithstanding, I am not convinced. The result, so far ascertained, is that some pathological anatomists say that the figures are high and others that they are low. I am of opinion that the cases of primary mesenteric tuberculosis are rare, as also results from the considerable amount of information tendered just now by Professor Tendeloo. The question is

not, how many cases of primary intestinal tuberculosis are found? but, how many cases thereof are due to the tubercle bacillus of the bovine type? I refer to the statistics published by Gaffky, who in the course of the last two years examined 300 children that had died in the hospital of Baginsky, whom Mr. Fibiger refers to as having gradually brought out higher figures than formerly. Among the cases mentioned in the above statistics there were 53 deaths from tuberculosis, while 4 cases were doubtful; among those 53 cases there was not a single case of bovine tuberculosis, the patients having all been victims to human tuberculosis. Should this special difference perhaps be explained by supposing that there is less bovine tuberculosis in Berlin than in Copenhagen? This question must for the present remain undecided.

As regards the view expressed by Calmette, I have expected long since that somebody would put forward the argument that the bacilli change their character on the way from the mesentery to the lungs. But this, gentlemen, is a mere hypothesis, supported by nothing. On the contrary, everything we know at present on this subject speaks against this hypothesis; for it is a proved fact that the bovine tubercle bacillus keeps its character for a very long time. I have repeatedly found virulent bovine tubercle bacilli in old, healed-up, strictly localized, and partly calcified glands where these bacilli must have remained capable of life for a very long time. I have likewise had occasion repeatedly to examine typical wart-like swellings on the hands of workmen employed in the slaughter of tuberculous cattle. Even where such nodules on the fingers of the patients had existed for years, bacilli of the unmistakable bovine type could be isolated from them.

Considering the great confusion which apparently exists with regard to the whole problem in question, I would urgently warn against inferences from a hypothesis which is absolutely unsupported."

THEOBALD SMITH: I wish to say a few words in regard to the passage of tubercle bacilli through the digestive tract into the lungs without being stopped in the mesenteric lymph-nodes. The evidence we have on this problem is based, first, on observations in the spontaneous disease; and, second, on experiment. In two species, swine and cattle, the spontaneous disease throws much light on this hypothesis. In swine we find that infection occurs almost exclusively through the digestive tract from the milk of cattle. The bacilli produce characteristic lesions in the regional lymph-nodes of the throat and the intestinal tract. Lung disease is quite frequent in pigs, but only in the form of miliary or disseminated tuberculosis. This indicates that the tubercle bacilli have been held back and have multiplied in the regional lymph-nodes and have reached the blood in a later stage from these nodes. There is no indication that the bacilli pass through the mesenteric nodes without lodging and producing primary disease there. Otherwise we should find only one or at most a few foci in the lungs and no lesions of the lymph-nodes of the mes-

entery. Fifteen years ago I made a long series of autopsies on cattle which had been tested with tuberculin, and many of which were in an early stage of the disease, in which the throat glands or the mesenteric or the thoracic glands or all three were involved, with intact organs. The conclusion which I reached at that time without bias or preconceived theory was that in practically all cases the tubercle bacilli would pass the mucous membranes and the alveoli of the lungs and lodge in the nearest lymph-nodes. There could even be observed a close relation between certain regions of the lungs and certain nodes. In later stages, when the lungs themselves were involved, certain nodes would be found heavily infected from certain definite regions. In cattle and pigs the evidence is thus very demonstrative that the bacilli are held back in the nearest lymph-nodes and that they do not pass directly through into the lungs. Finally, in cattle, the aërogenic infection is plainly demonstrated by the fact that the tubercles are confined to the dust-and-pigment-bearing lymph-nodes and to the dust-bearing zone thereof, and are not found in those nodes at the apex of the thorax which are free from dust and pigment unless the pleura or the cervical lymph-nodes are diseased. To the experimental evidence that feeding bacilli leads to the prompt infection of the lungs there are a number of objections or criticisms to record. These are aimed at the wide departure of the experiments from conditions obtaining in nature. Objections may be raised against—(1) the feeding of very large numbers of tubercle bacilli; (2) the use of bacilli, which, through artificial cultivations, have been changed as regards their relation to the invaded tissues; (3) the employment of the dog, which species stands in an uncertain relation to human or bovine tuberculosis; and (4) the killing of the animals soon after the feeding before the bacilli have had time to become anchored or fixed in the mesenteric nodes. I believe that the death agony which these experimental animals pass through soon after the feeding would tend to tear away from their temporary location in the lymph-nodes the bacilli which would remain there in the natural disease.

Prof. J. G. Adami (Montreal): We have now heard the opinions of workers in the various countries regarding the existence of infection by bacilli of the bovine type in man. We now know each other's views, and further discussion of the subject is not going to help us. But there is, I think, a matter that may be brought forward, and I wish to propound this question to His Excellency, Professor Koch: In his address before the Congress on Wednesday afternoon he stated emphatically that he confined himself to practical rather than to theoretical matters, and promised that during the next two or three years he would devote himself to the study of the incidence of the bacilli of the human or bovine type in cases of pulmonary consumption. Granted he does this, and suppose at the end of two or three years he finds—as for myself, I am fairly sure that he will find— that practically all cases of pulmonary

phthisis in men are due to bacilli of the human type, I would ask the question: What practical use is there in the investigation and in this delay? For at the end of the period we shall still be confronted with the problem of the eradication of tuberculosis in cattle, and that because, as he has admitted here and in London, a certain proportion of cases of the disease in man, though not of the pulmonary type, are due to the bovine bacillus. It seems to me, Mr. Chairman, rather unfortunate that both here and in London Professor Koch did not take up the other point which he has emphasized, namely, that so far not a single case is known in which the human type of bacillus has been found in the bovine organism under natural conditions, and, experimentally, only when we modify the conditions and use mixed cultures. Here, as I pointed out two years before Professor Koch's London pronouncement, is a matter that is eminently practical; for if this be admitted, then it is possible to eradicate bovine tuberculosis, even when we take no adequate steps to eradicate the human type in man. Granted that human and bovine cases coexist in a locality, the human type will not, under ordinary conditions, give the disease to cattle. Why not take up a line of work the result of which must be of immediate utility, rather than one which must, when concluded, leave us at most where we started?

PROF. KOCH: I would again call attention to the fact that human tuberculosis is the principal point of attack, because eleven-twelfths of the patients perish through this type of the infection. I admit that bovine infection can occasionally occur, and I desire not to be understood as disregarding the endeavors to extirpate bovine tuberculosis, as far as these endeavors are dictated by agricultural and economic reasons. But I mean that it would be wrong to give to these proposals the leading place in front of the efforts to combat human tuberculosis.

PROF. FIBIGER: Professor Koch has claimed that a great many of my figures especially apply to cases that were selected. This I deny. They were not selected. The results of Gaffky, to which Professor Koch refers, are not completed, nor have they to my knowledge been published. I can refer, so far as the other point is concerned, to the publications of Kleine, who reports two cases of hand infection in which the bovine bacillus was found.

PROF. KOCH: I object to the interpretation of this latter finding, as it is evidently not conclusive in any respect; for we might be dealing here with cases of infection by human bacilli, as we frequently find them, in the shape of primary lesions, with pathological anatomists. In that case, such a finding differs very much from the cases mentioned by myself, where very virulent bovine tubercle bacilli were found in primary tuberculous lesions after many years.

THE CHAIRMAN: It does not seem to me that we are very far apart. We have human and bovine tuberculosis, both of which are of great importance.

There is no question but that the vast majority of cases of human tuberculosis are due to human bacilli. There is a small proportion which are due to either the human or bovine bacillus. The only difference of opinion seems to be with regard to the question as to how large a percentage of that residuum is due to human infection or is due to bovine infection, and the question comes up: Is it possible to arrive at any kind of conclusion in a resolution which will put in form the feelings of the members of this conference in regard to this question? I think that is what should be considered in the few minutes left at our disposal.

DR. FLICK: I wish to inform this conference that a rule has been adopted by the central committee of the Congress that no resolutions can be considered which bear on a scientific problem. That would not preclude this conference from adopting a resolution for its own purpose, but I do not believe that such a resolution could be presented to the Congress itself.

PROF. KOCH: Gentlemen, we are dealing here with a purely scientific subject, and the questions proposed cannot be settled by any resolution. We are speaking of objective facts and not of subjective views. I for my part most earnestly refuse to join in any resolution on this subject.

PROF. WOODHEAD: I look at this matter from a practical point of view. While we cannot settle these scientific questions definitely, as Professor Koch has pointed out, still we all agree that there are certain definite practical data we have at our command, and some resolution might be drawn up dealing with this purely from scientific aspects. The question which Professor Koch has pointed out is of minor importance when we come to deal with this more practical question.

DR. EASTWOOD (London) was of opinion that a resolution ought to be passed and afterward placed before the Congress, in the closure meeting, on the following three practical questions: (1) Is the danger from the tubercle bacillus of the bovine type so slight for human health that it may practically be disregarded? (2) Does the consumption of milk containing bovine tubercle bacilli cause an increase of morbidity or mortality in children? (3) Is the institution of a supply of milk free from bovine tubercle bacilli a means that can efficiently assist the combat against human tuberculosis?

PROF. KOCH: We have not at all discussed this subject; how can resolutions of purely practical importance be brought about in this meeting on things which we have not discussed to-day? I repeat I shall abstain from any resolution.

DR. PEARSON seconded the motion of Eastwood, and pointed out that, according to the general impression, Koch has estimated (in 1901, in London) the transmissibility of bovine tuberculosis to man so low that measures against bovine tuberculosis would be without importance to the public health. If, as Fibiger has explained from the statistics of Baginsky, the

cases of primary intestinal tuberculosis have considerably increased in Berlin since then, the question would have to be asked whether any neglect of precautionary measures in connection with the consumption of milk has occurred in consequence of the London statement.

A lengthy discussion ensued, in which Messrs. Flick, Smith, Ravenel, Arloing, and Eastwood took part, on the question whether and how the results of the conference are to be brought before the public.

Several orators pointed out the necessity to publish some account of the session. Finally, it was proposed to place the shorthand minutes before the public.

PROF. KOCH: I have not the slightest objection to the publication of an exact report of this meeting. Why should I object to the statement that I recognize the transmissibility of bovine tuberculosis to man? I have never denied it. I propose, therefore, that a report shall be published, after the shorthand notes have been seen and signed by each speaker, but the report is only to be a mere reproduction of the spoken word, of the facts stated and of the opinions expressed, and is in no way to take the shape of any resolution, especially not on any questions which we have not discussed.

This arrangement proved acceptable, and after its adoption the meeting adjourned.

SECTION VII.

Tuberculosis in Animals and Its Relations to Man (*Continued*).

FIFTH SESSION.

Thursday, October 1, 1908.

THE DIAGNOSIS OF TUBERCULOSIS IN ANIMALS.

Section VII of the International Congress on Tuberculosis was called to order by the President, Dr. Leonard Pearson, at half-past nine o'clock, on Thursday morning, October 1, 1908.

THE INFECTION OF SWINE FROM TUBERCULOUS CATTLE.

By Dr. A. W. Bitting,
Purdue University, Indiana.

After the announcement made by some of the western newspapers that the stock from certain localities, particularly in Iowa and Wisconsin, would not be purchased by the packers because of the high percentage of loss in both hogs and cattle due to tuberculosis, an inquiry was started to determine whether such infected areas existed in Indiana. It was believed that it would be better to determine such areas ourselves rather than have the packer point them out and advertise them far and wide. The creamery men were appealed to, to inform us when hogs would be sent to market and to permit their tagging so that they might be identified on slaughter and inspection. This was declined.

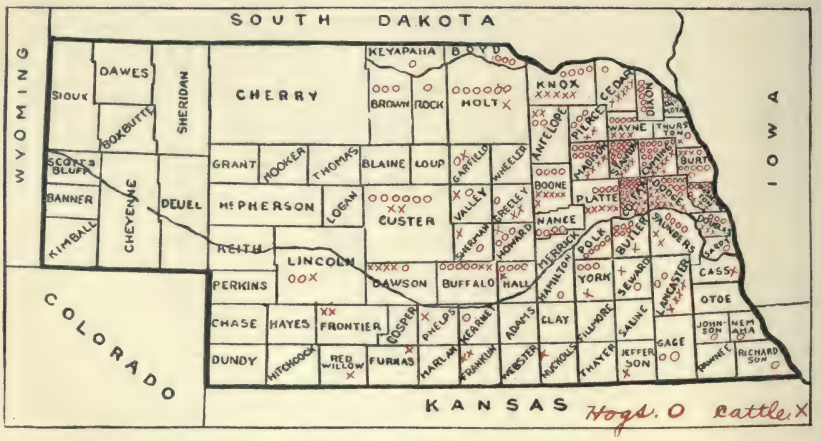
The Bureau of Animal Industry, through its local inspectors, has frequently notified us of the origin of certain tuberculous cattle, and these have been traced to the farms and inspection made of the herd.

During the past three years the local inspectors of the Bureau have reported the presence of any extensive outbreak of tuberculosis occurring in

hogs, and these have been traced to their origin, with the result of finding herds not previously suspected of having any tuberculous stock. Some of these have shown from 20 to 70 per cent. of infected cattle, and upon post-mortem as much as 33 per cent. would fail to pass on inspection. This has been true of pure-bred herds as well as of purely commercial dairy herds. With one exception, every important find of tuberculosis in the past three years has had attention attracted to it by the hogs coming from the premises.

The point which I desire to make is that, as far as may be practicable, a record should be kept in local inspection of the origin of all tuberculous hogs and furnished as a basis for the investigation of the condition of other stock upon the farm. This is not practicable in the large packing centers, but the Bureau has supervision over many small concerns in the smaller cities where such detailed information can be obtained.

The further work—that which I had expected to report upon, the experiments with hogs of different ages at two months, four months, six months, and eight months, to the susceptibility to tuberculosis from milk and excrement of tuberculous cattle—has been brought to an untimely end by an intercurrent disease, only seventy unsatisfactory animals of more than two hundred remaining to be examined.


SOUTH DAKOTA
WYOMING
COLORADO
KANSAS
IOWA
DAWES
SIOUX
SHERIDAN
CHERRY
KEYAPAHA
BOYD
KNOX
BROWN
ROCK
HOLT
ANTELOPE
CEDAR
DIXON
PIERCE
WAYNE
THURSTON
BURT
GRANT
HOOKER
THOMAS
BLAINE
LOUP
GARFIELD
WHEELER
BOONE
PLATTE
DODGE
SAUNDERS
WASH-INGTON
DOUG-LAS
SARPY
SCOTTS BLUFF
BANNER
KIMBALL
CHEYENNE
DEUEL
MCPHERSON
LOGAN
CUSTER
VALLEY
GREELEY
NANCE
POLK
BUTLER
COLUM-BUS
SAUNDERS
LANCASTER
SARPY
KEITH
LINCOLN
SHERMAN
HOWARD
MERRICK
HAMILTON
YORK
SEWARD
CASS
PERKINS
DAWSON
BUFFALO
HALL
OTOE
CHASE
HAYES
FRONTIER
GOSPER
PHELPS
KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
JEFFER-SON
GAGE
JOHN-SON
NEMA-HA
RICHARD-SON
DUNDY
HITCHCOCK
RED WILLOW
FURNAS
HARLAN
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
Hogs. O Cattle. X

TUBERCULOUS HOGS AN INDICATION OF TUBERCULOUS CATTLE.

By Dr. A. T. Peters,
Department of Animal Pathology, University of Nebraska.

In presenting before this Congress the subject of "Tuberculous Hogs an Indication of Tuberculous Cattle," I wish to discuss principally the work carried on in Nebraska from May 1, 1907, to May 1, 1908. During the winter of 1907, when the legislature was in session, a resolution and appropriation for $1000 was passed for the Department of Animal Pathology to investigate tuberculosis among swine in our State. Prior to this time there had been nothing done on account of lack of funds. Our State Veterinary Department has only a meager appropriation, which barely covers the expenses of police work. For this reason it could not take up in detail the work of tuberculosis.

After the appropriation became available, our department immediately began to study the question of tuberculosis. We made arrangements with the Bureau of Animal Industry whereby we secured the names of owners who had shipped live-stock to the South Omaha market and who had part of their animals condemned for tuberculosis. After we received the names we tried to visit their farms to ascertain the conditions existing on these farms. It was important for us to become familiar with the kind of live-stock these farmers owned, the number of cattle and hogs on the place, the way they were fed, and whether, previous to our visit, they had any knowledge of their stock having tuberculosis. The government reported 281 farms as sending tuberculous stock. These 281 farms were located in fifty-five counties. Of these fifty-five counties, forty-seven were for swine tuberculosis and forty-one for tuberculosis in cattle. In thirty-three of these counties tuberculosis was reported in both cattle and hogs.

It is interesting to note that tuberculosis both among cattle and among hogs has been confined largely to one center in our State. This was indeed very surprising to us. Certain groups of counties are very much more affected with tuberculosis than others. It has also been found that when large shipments, especially of hogs, come from these counties, the percentage of condemnations is very large, running, sometimes, more than 3 per cent. When the percentage of condemnations for any given day has been very

large, an examination of the records showed that the counties known to be greatly affected with tuberculosis in swine had supplied the greater percentage of that day's killing. This was tested repeatedly when we would receive information from the government inspector that the condemnations were unusually numerous. This proves the assertion made by Dr. Burton Rogers several years ago, when he undertook to tag the 3430 hogs before the farmers unloaded them from their wagons. These tagged hogs were always killed separately. In this way he was able to trace back to the owner every tuberculous hog. He states that out of about 600 different hog-raisers bringing hogs to this one market, thirty-nine brought in all the tuberculous hogs. Our work in Nebraska for the last year in coöperation with the government in trying to trace the source of tuberculous animals is giving every evidence that Dr. Rogers's statement is true that infection comes from a small area, and that if the State was so provided with funds and facilities and a definite knowledge of where the infection existed that it could purchase and slaughter these animals, and thereby clean up infected areas, it would materially aid in stamping out tuberculosis in a short time. I wish to mention here that not only is it necessary for the State officers to be provided with ample funds to carry on this work, but I find that it is also necessary to have the people well educated in the fundamental principles of tuberculosis, and that the owners of live-stock should be thoroughly conversant with the dangers of this disease, that they should know how the disease spreads, the way to prevent it, and that it is an economical proposition to them to study the importance of tuberculosis, and that tuberculosis among hogs is far more treacherous than hog cholera, which only visits the farms once in many years, as proved by statistics. Tuberculosis remains on the premises permanently, and if he does not do anything to eradicate this disease, he will eventually have to go out of business. For this reason it is important that the methods in our State work should be thoroughly revised, so that not only large appropriations shall be granted, but that provisions shall be made to thoroughly educate the farmers and stockmen as to the dangers of this disease. This education should be one that would not scare or frighten the owner so that he would feel that the literature he was receiving was an exaggeration, thereby, instead of promoting the cause, making him an enemy who would favor antituberculosis legislation. I have been watching the progress that is being made in other States regarding this important subject, and the more I have studied the question, the more I have become convinced that when the stockman is thoroughly familiarized with the issue, and given plenty of time to think over the question, he is a very good man to work with, and would favor reasonable legislation. Knowing this fact, I started the work in our State by organizing a reading club. This reading club is largely composed of farmers and stockmen throughout the State. Ninety per cent. of

the members make stock-raising their principal occupation. These men were interested in the reading club, and the only requirement made was that after a certain period they had to return question blanks, properly filled out, before they could secure new literature. Lack of funds prevented us from printing literature, but the government and the experiment stations, having a large number of pamphlets that are well adapted for this work, were applied to and sufficient copies secured. These were then gone over and questions prepared. These questions were shortly sent to the members of the clubs, who filled out and returned the reply blanks to the office. After the blanks had been returned, another pamphlet was sent to them. Not only have we used the members just for the reading club, but we have secured a number of them to do missionary work in their own locality and secure new members. Many of the members have urged stockmen and dairymen in their community to have their herds tested by our Department or by the local veterinarian. In this way much good has been accomplished. We also feel that through this reading club we are securing a large number of people who will be willing to give accurate information to our various stock associations and to the members of our legislature if it becomes necessary to pass a suitable law for the eradication of tuberculosis from the State. Largely through the reading club and through coöperation of the Bureau of Animal Industry we have been able to test 42 herds of cattle, with a total number of 2543 head. Out of this number, 93 head reacted; 46 of these were killed, and a post-mortem examination revealed tuberculosis. The remaining 47 head were disputed, and these were retained by the owners, under proper quarantine restrictions, to be tested again. This shows a percentage of 3.65 of cattle that reacted to the tuberculin test. We have records of 386 head of cattle that were tested by the owners themselves, formerly agricultural students. These comprised 16 herds. They were only small herds. The students did the work themselves, and copies of the temperature sheets were sent to us for verification. Out of this number there were 29 head, or 7.51 per cent., condemned by our department, 18 of which have been reported to us as having been killed and found to be tubercular. I mention this to show that the tests were made quite accurately by the students themselves. Of the remaining 11 head, the accuracy of the test was disputed, as the owners made the test just before gestation. Assurance was given that these animals would be tested again, and if they reacted, they would be slaughtered.

Out of the 281 farms reported to us, 222 were visited by representatives of our department and the conditions carefully studied. We were surprised to find that a large percentage of the farms, especially on places where tuberculosis existed among the hogs, were receiving separator milk. We noticed, however, that a larger percentage than was anticipated had never

received dairy products, and that by no means is skim-milk entirely accountable for the infection of tuberculosis in hogs. Two herds in particular where there was a large condemnation had not been receiving dairy products, but that tuberculosis existed among the cattle was discovered later through the tuberculin test and the post-mortem examinations. Previous to destroying these animals, samples of the fecal matter were secured, and examinations of the same revealed tubercle bacilli. The method given in Bulletin No. 99 of the United States Department of Agriculture was used for making these examinations.

I have become more and more a believer that hogs become affected to a large extent through fecal matter, because of the habit of breeders in allowing their hogs to follow cattle. There is no question but what this practice gives occasion for a large percentage of the condemnations among the hogs. Through this matter the lymphatic system becomes infected, and glandular tuberculosis, which is by far the most frequent, is caused by hogs being compelled to follow and gain their sustenance through the offal of diseased cattle. We are making careful examinations along this line to verify more conclusively this statement. But enough evidence is at hand at this time to warrant the statement that if our system of feeding hogs were changed, the number of tuberculous hogs would be greatly reduced. There is no question but what we have overlooked the great source of infection, that is, the fecal matter, and on account of this oversight the States that are supplying a large percentage of the hogs have suffered such a rapid increase in the disease.

Coöperation at the packing centers between the government and the State is practical, fruitful of results, and important, and should be cultivated and perfected. The government is in a position to aid the State authorities in a most wonderful way if the State authorities are only willing to accept the assistance. It is through the government inspectors that the State can locate the infected centers; and then if these places are visited by representatives and the conditions noted, the representatives can in the larger percentage of cases persuade the owners to clean up their herds. It is a pleasure to me to report that 66 of the 281 farms reported to us have cleaned up their herds in one way or the other, either by using the tuberculin test or by sending the animals to the abattoirs subject to inspection; and that these people are assisting the department at this time. They are very desirous of not having diseased stock on their premises. It is a remarkable fact that 92 per cent. of the 281 farmers reported that previous to our visit they had no knowledge of any disease in their herd, and were very much surprised when they were informed that animals had been destroyed. This is all the more emphasized where hogs had been condemned by the inspectors of the government itself. One of the embarrassing features that we had to contend with in visiting these farms was to inform the owner that the government had con-

demned animals of his shipment, for it is a fact that repeatedly some of the best-looking animals, and the ones that topped the markets at our abattoirs, have been condemned. It has been a surprise to the owner when we would visit him a week later and tell him that four, five, or six of his animals had been condemned, and it is a very difficult matter to explain to the stockman how fat animals in the prime of condition and topping the market could be condemned by the government inspectors. And then comes the task of convincing this man that the government official really did find the disease in the carcass, and that it would be well for him to clean up the remainder of his herd. Here again comes in the value of resorting to literature and correspondence. I will admit that we could not at the first time convince an owner that the remainder of his herd was in danger, but by supplying him with literature we convinced him that it is possible for animals in the best condition to be diseased. These men have become thoroughly interested and are working for better conditions. In going over the map of our State which shows the affected areas I must again call attention to the fact that has been observed by Dr. Rogers, that the infection is located in one place, and for this information I believe that it would be well for our government to make regulations by which the animals could be identified when they reached the killing floors. Much as I have investigated this matter and spoken to the proper authorities about a tagging and identification system of this kind, they have thought it not feasible, but I am sure that the time will come when such tagging will become necessary, for if the government or States will continue to follow the source of infection and find the same, as we have done in our State, it will show that tagging is the only feasible way of eradicating this disease, and that it is much cheaper than any other method. At the present time it does not seem popular, but I believe that by proper agitation, bringing the matter before the public, the opposition would soon be greatly diminished.

The work that is in progress at this time is a continued study of the source of infection and the promotion of our reading club throughout the entire State, so that the people will request to have their herds tested instead of being compelled to have it done. The importance of this campaign of education is shown by the fact that if we had assistance enough we could test practically as many herds in one month as we tested in the twelve months last year. It is hoped that aid will be given to the State authorities to meet these demands by the creation of sanitary boards similar to the ones existing in Pennsylvania and Minnesota. From our reports and from the statistics at hand it seems as though the affection has not gained any considerable foothold in the state of Nebraska, and that if suitable measures were to be enacted at an early date, the disease could be prevented from spreading.

The Bang system has been advocated in our State, and also a modification of this system made by Dr. Johnson, but none of these have been found to be practical on our farms, for it seems to be very expensive to maintain this system. Several of the best breeders in our State have been investigating the question, and no doubt experiments along this line will be taken up.

Vaccination against this disease has not been recommended, on account of a lack of funds; and, furthermore, as our department has considered it still in its experimental stage, we for this reason did not care to use this treatment, as it may prove a hindrance to the eradication of tuberculosis. The department is watching with great interest the experiments conducted by others along these lines.

The tuberculin test has proved very satisfactory, and through this agency we have a means for detecting tuberculosis in a herd, and we can very readily clean up a herd. This work encountered a great deal of opposition, for the reason that the State had no compensation to offer for these cattle. It is interesting to know that in every instance where tuberculosis had been found on the post-mortem floors and the remaining herd visited and tested with tuberculin, evidence of the disease was found in the herd.

In conclusion, I wish to say that by giving our State proper legislation, and by a continual and plentiful dissemination of proper literature to the stockmen and the farmers, thereby enlisting their hearty coöperation instead of their antagonism, and by the splendid aid of the agricultural press, progress in stamping out tuberculosis will be achieved.

The following is a list of the bulletins of the Bureau of Animal Industry and the experiment stations that have been secured for the reading club in our State:

Circular 118 of the U S. Dept. of Agr.: "The Unsuspected but Dangerously Tuberculous Cow."
Bulletin 92 of the Ia. Expt. Sta.: "Tuberculosis in Swine."
Bulletin 277 of the N. Y. Expt. Sta.: "The Bang Method of Controlling Tuberculosis, with an Illustration of its Apparatus."
Bulletin 44 of the U. S. Dept. of Agr.: "Infectiveness of Milk of Cows which have Reacted to the Tuberculin Test."
Bulletin 38 of the U. S. Dept. of Agr.: "Tuberculosis of the Food-producing Animals."
Paper by Dr. G. A. Johnson: "The Disposition of Tuberculous Cattle."
Circular 79 of the U. S. Dept. of Agr.: "The Tuberculin Test for Tuberculosis."
Bulletin 78 of the N. H. Expt. Sta.: "Bovine Tuberculosis."
Bulletin No. 77 of the N. Dak. Expt. Sta.: "Bovine Tuberculosis."
Bulletin 126 of the Wis. Experiment Sta.: "Two Ways of Treating Tuberculosis in Herds."
Circular 70 of the U. S. Dept. of Agr.: "Tuberculosis of Cattle."
Bulletin 108 of the Ohio Expt. Sta.: "Bovine Tuberculosis."

THE TUBERCULIN TEST AN EFFICIENT AGENT FOR THE DETECTION OF BOVINE TUBERCULOSIS.

By Geo. B. Jobson,
Veterinarian, Franklin, Penna.

Whatever difference of opinion may exist relative to the question of the transmissibility of tuberculosis from bovines to man, there can, however, be none relative to the injurious effect which bovine tuberculosis, from its contagious nature, has on the cattle trade of infected countries. The danger of transmitting the disease to healthy herds, or into localities free from infection, and its prevalence, particularly in dairy districts, are of themselves grave conditions affecting the welfare of the live-stock interests of the State; the question, therefore, of the most efficient method whereby it can be controlled is one necessarily demanding the earnest and thoughtful consideration of the national or State authorities in charge of this department of control work.

In its economic aspect, we have in bovine tuberculosis a scourge the ravages of which are productive of serious financial loss to the agricultural resources of the State, on account of deaths and depreciation in the value of tubercular cattle; and, on the other hand, an ever-present possible danger to the community from the consumption of their flesh or milk. We have had other bovine plagues in America, such as contagious foot-and-mouth disease and contagious pleuropneumonia, which were a menace to the cattle trade of this country. The campaign against the former disease was short, sharp, and decisive; that against the latter occupied five years, and was finally eradicated with an expenditure by the Federal government of $1,500,000. Although stockmen of that period looked on the means used for its suppression as a doubtful and expensive experiment, the result accomplished in freeing this country from this destructive bovine plague fully justified the expenditure. Pleuropneumonia, however, was only dangerous to cattle, whereas in tuberculosis we have to contend with a much more dangerous disease, the consensus of opinion of the best authorities being that tuberculosis may be transmitted to man through the ingestion of bovine bacilli in the flesh or milk of tubercular cattle, the difference existing between the morphological characters of the human and bovine bacilli being merely one of environment. Insidious in its approach, and slowly progressive, it is a far more subtle and treacherous foe, usually giving no visible indications of its presence until is has attained a firm foothold in the herd, and scattered broadcast the germs of

infection; and it is only in the advanced stage of the disease, when the animals are about useless for the butcher or the dairy, that it can be detected on physical examination and without the aid of the tuberculin test. In the light of recent research by the Bureau of Animal Industry we see that tubercular cattle giving no visible evidence of having tuberculosis, yet may become infective to those which are healthy, through contamination of their food by the feces of diseased animals. In filthy stables and dairies where the milk is not drawn from the cows and handled in a cleanly and sanitary manner it is frequently contaminated by bovine feces, and in untested herds the consumer has thus no assurance that his milk does not contain tubercular bacilli.

Although it is not claimed that the tuberculin test is absolutely infallible as a diagnostic agent, yet every veterinarian employed in the work of control knows the difficulty of detecting bovine tuberculosis by physical examination, unless in cattle extensively diseased, and those who have had the largest experience in this work admit that there is no other method whereby tuberculosis can be so readily and accurately diagnosed as by the tuberculin test. It does not always follow that because cattle are in good condition and look healthy there is no tuberculosis in the herd. Even after a test has been made and previous to slaughter and autopsies being held on reacting animals, the owner has been known to doubt the accuracy of the diagnosis. In a herd of fifty head tested by the writer some few years ago, twenty-two reacted. On autopsy, several of the reacting animals were found to have extensive tubercular lesions. One fine young Jersey cow, a family pet, had tuberculosis of the udder, her milk being used by the owner's family. These cattle were principally registered Holsteins and Jerseys, were in the pink of condition, and the most improved hygienic methods were adopted in the management of the herd. The owner, an experienced breeder, had no suspicion that tuberculosis existed in the stable until two fat cattle were sold to the butcher, which on being slaughtered were found to have extensive tubercular lesions. On a retest of the herd being made eight months later, only one animal reacted, the post mortem showing slight tubercular lesions in the post-pharyngeal glands. The herd did not again come under our personal observation.

The case of the herd belonging to the State Institution for the Feeble-Minded at Polk, Venango County, Pennsylvania, illustrates the value of the tuberculin test in eradicating tuberculosis from an infected herd. This herd, composed principally of registered Holsteins, numbering seventy head, was tested on August 30, 1903. All the registered cattle had previously been tested. Nine untested grade cows were purchased on January 29, 1903, near Conneautville, Crawford County, Pennsylvania. When tested with the other members of the herd, five of thse cows reacted. They were at once separated from the healthy animals and quarantined in a stable half a mile distant from the dairy stable and afterward slaughtered. All had well-developed tuber-

cular lesions. In one cow they were extensive. The premises were thoroughly disinfected and whitewashed, the stalls occupied by the infected cows kept vacant for a a considerable time, and before being occupied were again disinfected. On March 30, 1904, about eight months later, a retest of the whole herd, numbering eighty head, resulted in no reactions. On January 21, 1907, nearly three years afterward, the whole herd, now consisting of one hundred and thirty head, was again tested, with the same result—no reactions.

This particular instance illustrates how quickly tuberculosis can be detected and eliminated from an infected herd by using the tuberculin test. We will now give an illustration of the protection afforded by tuberculin in preventing the introduction of tuberculosis into a healthy herd. The Argeon dairy herd, located in the vicinity of Franklin, Pennsylvania, is composed partly of Red Polled cattle, excellent individuals, and partly of grade Jerseys —in all, about fifty head. The proprietor, an experienced and cautious breeder, bought some few years ago, at public auction, for himself and two other parties, two Shorthorns, two Jerseys, and three Holsteins, all apparently in good healthy condition. As a precautionary measure, however, before mixing the seven cows with the regular dairy herd, the owner put them in quarantine in a separate stable and had them tested. The two Shorthorns and two of the Holsteins reacted. The reacting Holsteins were appraised and slaughtered. The two Shorthorns, one being a heifer and the other a cow in her prime, were in such splendid condition that the owner did not believe they were diseased, and rather than have them destroyed, isolated them on a farm where no other cattle were kept. The heifer was accidentally killed, and the cow, after calving, commenced to run down in condition, and on being slaughtered about nine months after the test, was found to have extensive tubercular lesions in both lungs. Had these tuberculous cattle been at once mixed with the healthy herd, we can realize what would have been the result. The herd has been again tested since this occurrence and found to be free from tuberculosis.

Among the several reasons why the tuberculin test, systematically applied for a few times, and at proper intervals, fails to eradicate tuberculosis, is the very inefficient manner in which the stables are disinfected by the ordinary farmer, and the failure to at once separate and place the reacting animals in quarantine.

No doubt there are instances in which tuberculin fails to detect the existence of tuberculosis, or there are doubtful reactions in which it is difficult to determine whether the inspector has got a true tubercular reaction, or whether the rise in temperatures proceeds from some other cause. In many cases these failures are largely attributable to carelessness in neglecting to have the animals kept under exactly the same normal conditions for a day or

two preceding, and until the completion of the test. In advanced tuberculosis, where the system is saturated with tubercular toxins, there is sometimes little, if any, reaction. Quite frequently, however, the temperatures of these animals are a degree or so above normal previous to the injection of tuberculin. Also when, for fraudulent purposes, cattle have been treated with repeated injections of tuberculin, they will cease to react.

Advanced pregnancy, in most instances, does not apparently interfere with the accuracy of the test. The temperature of cows in this condition, especially heifers, may in some cases run a little higher than normal, but the injection of tuberculin, if they are free from tuberculosis, will not cause any appreciable elevation of temperature. Neither, as a rule, will the fact of a cow being in heat, if shut up during the period of estrum, have any adverse influence on the test; nevertheless, in all doubtful cases, after a proper interval, a retest ought to be made. The temperatures of very young calves are frequently erratic, and it is much the safer plan, when suspected of having tuberculosis, to hold them in quarantine until they are at least six months old, previous to testing. Cattle exposed to extreme cold previous to taking their initial temperatures, and kept in a warm stable during the remainder of the test, are not likely to give accurate results. Their initial temperatures in some cases range from 98° F. to 100° F. Under the same conditions, were no tuberculin used, there would be a perfectly natural reaction following the low temperatures of the preceding day.

Those opposed to the tuberculin test point to the fact that cattle tested prior to purchase have, on a retest, reacted. Such cattle have either not been honestly tested—for there are a few unscrupulous men in the veterinary as well as in other professions—or they may have come out of a tuberculous herd, and, the infection not having advanced further than the incubative stage, they were, when tested, not yet susceptible to the action of tuberculin. Unless absolutely sure that the herd from which the cattle are purchased is free from tuberculosis, it is advisable to quarantine them for two months or so, and retest them before they are mixed with the herd.

While the test is an efficient medium for diagnosing the existence of tuberculosis, the amount of reaction does not indicate the extent of the lesions. Young animals in good condition, when tuberculous, are very susceptible to the action of tuberculin, and consequently their reactions are usually higher than in old cows. On slaughtering these young animals giving high reactions the lesions are often slight, and confined, in the majority of instances, to the mediastinal or bronchial lymphatic glands. On this account parties have sought to discredit the test on account of the limited character of the lesions, ignoring the fact that it is merely a question of time when these slightly diseased animals may, in time, become foci of infection to the healthy members of the herd.

Among the several charges which have been made against the use of tuberculin, one is that its use will communicate tuberculosis to the animals operated on. This charge is entirely without foundation. If, as is now generally conceded, tuberculosis is a bacterial disease, transmitted to animals by the introduction of the living bacilli into the animal organism, it is utterly impossible that the injection of tuberculin can communicate tuberculosis to cattle, the cultures from which it is made being sterilized by heat and afterward filtered to remove the dead bacilli. The test of the Polk herd, to which the writer has previously referred, shows that its use in this case had no such injurious result. The first test and autopsies proved that five animals had tuberculosis. On a retest, about eight months afterward, no reactions; and on a third test, after nearly three years, still no reactions, nor any visible symptoms of tuberculosis. Surely, here was ample opportunity to test the validity of the assertion that tubercular infection would follow the use of tuberculin.

Another charge is that the test has produced abortion in pregnant cows. We have tested somewhere near about four thousand head of cattle, this number being composed principally of milch-cows, some of them in advanced pregnancy, and we have failed to hear of a single well-authenticated case which could be traced to this cause; neither has any complaint come from the owners of any of the tested herds that abortion has followed its use.

In Pennsylvania the meat hygiene service provides a convenient method whereby reacting animals can be disposed of with safety to the public health and the owner indemnified for his condemned carcasses. Reacting cattle which have been tested by authority of, or reported to, the State Live-stock Sanitary Board can be slaughtered at a slaughter-house and inspected by an agent of the Board, under the rules governing the meat hygiene service. Condemned carcasses are appraised and compensation allowed the owner according to a scale fixing their value, thereby protecting both the public health and recompensing him for his loss. Previous to the organization of the Pennsylvania State Live-stock Sanitary Board there was no systematized method of controlling tuberculosis or disposing of diseased carcasses, and we can safely assume that carcasses which are now condemned under inspection would formerly, in many instances, be exposed for sale. Should the owner of reacting cattle prefer the Bang method for their disposal, he can do so by keeping them quarantined in a stable separate from the healthy cows, taking away the calves when dropped, and sterilizing or pasteurizing the milk previous to its use for any purpose whatever. Visibly diseased cows, with advanced tuberculosis, are destroyed and the owners indemnified for their loss. The busy American farmer, however, with his high-priced labor, does not take kindly to the Bang system of disposing of reacting cattle. There is too much trouble and expense in running two separate herds, and it is a difficult task getting the help to give the extra care and attention necessary in feeding,

watering, and milking two separate herds. The sterilization or pasteurization of the milk from the reacting cows also requires care, and it is a continual source of worry and annoyance keeping the tubercular animals apart from those which are healthy. Unless, therefore, the reacting animals are exceptionally valuable, the owners usually prefer having them slaughtered.

It may be asked what results have been achieved in Pennsylvania by the State Live-stock Sanitary Board in controlling bovine tuberculosis by the use of the tuberculin test. Taking as a basis the writer's own experience in this work, from its inception in 1896 to the present time, during which period he has tested somewhere about four thousand head of cattle: of the first 400 tested, 22 per cent. reacted; of the last 1000 tested, 6 per cent. reacted. The majority of the herds were suspected of being infected with tuberculosis, while a few others were tested either for sale purposes or in order to advertise the milk-supply to be from tuberculin-tested cows. The counties in Pennsylvania covered by the tests were Crawford, Venango, Butler, Clarion, Forest, and Warren. These figures do not refer to, nor are they estimates of, the percentage of tubercular to healthy cattle in the counties named. They give the relative percentage of reacting cattle in herds tested, and which in the majority of instances were suspected of being infected with tuberculosis. In the more recent tests the decided diminution of reactions would indicate that bovine tuberculosis in that section of Pennsylvania is now more fully under control, and if the experience of the other agents of the State Live-stock Sanitary Board agrees with that of the writer, it is reasonable to suppose that in these later years there has been a decided decrease in the percentage of tubercular cattle over the entire State.

Las Pruebas de Tuberculina son un Agente Eficiente para Averiguar la Tuberculosis Bovina.—(JOBSON.)

Prevalencia de la tuberculosis bovina en los distritos dedicados á las industria de leche y crianza de ganado. Su aspecto económica, pues la tuberculosis bovina produce serias pérdidas financieras en los intereses de la crianza en los lugares infestados. Peligro en el consumo de la carne y la leche de ganado tuberculoso. Pérfida en sus ataques y de progreso lento, gana firme terreno en el rebano antes de que pueda descubrirse su presencia. Dificultades del diagnóstico por examen físico, á ménos que sea en casos avanzados. Los veterinarios que han tenido grande experiencia en el trabajo de contrarrestar la tuberculosis, admiten que las pruebas de tuberculina son el más seguro método para diagnosticar la enfermedad. Casos citados para ilustrar su eficiencia. El fracaso es el resultado del descuido y la inexperiencia. Causas que invalidan la exactitud de la prueba. El método de Pennsylvania de disponer de ganado reactivo. Disminución del percentage de reacción en los últimos años en rebaños probados en Pennsylvania.

La Réaction de la Tuberculine; un Agent efficient pour découvrir la Tuberculose bovine.—(JOBSON.)

Prédominance de la tuberculose bovine dans les endroits occupés par l'industrie laitière et l'élevage des bestiaux. Son aspect économique, la tuberculose bovine produisant une perte financière sérieuse dans les régions infectées. Le danger provenant de la consommation de la viande et du lait de bestiaux tuberculeux. La tuberculose, arrivant insidieusement et faisant des progrès lents, s'établit de pied ferme dans le troupeau avant que sa présence puisse être découverte. Difficulté du diagnostic par l'examen physique, jusqu'à la phase avancée de la maladie. Les vétérinaires avec beaucoup d'expérience admettent que la tuberculine nous offre la meilleure méthode diagnostique.—Citations de cas pour illustrer l'efficacité de la tuberculine. La non-réussite est le résultat du manque de soin et d'expérience. Causes qui annullent l'efficacité de la réaction. La méthode en usage en Pennsylvanie pour disposer du bétail qui réagit contre la tuberculine. Diminution, pendant les derniéres années, du pourcentage des réactions dans les troupeaux de la Pennsylvanie, chez lesquels la tuberculine a été employée.

Die Tuberkulinprobe ein wirksames Mittel für die Entdeckung der Rindertuberkulose.—(JOBSON.)

Das Vorherrschen von Rindertuberkulose in Gegenden mit Milchprodukten und Viehzucht. Der ökonomische Standpunkt; Rindertuberkulose kann sehr schweren finanziellen Verlust den Viehzuchtinteressen infizierter Länder beibringen. Gefahr von dem Genuss von Fleisch und Milch tuberkulöser Rinder. Schleichend in ihrer Annäherung und langsam fortschreitend, gewinnt sie eine starke Stütze in der Herde, bevor ihre Anwesenheit entdeckt werden kann. Schwierigkeit der Diagnose durch die physikalische Untersuchung ausser in vorgeschrittenen Fällen. Diejenigen Tierärzte, die eine grosse Erfahrung in dem Werke der Kontrolle von Rindertuberkulose gehabt haben, geben zu, dass die Tuberkulinprobe die sicherste Methode der Diagnose dieser Krankheit ist. Fälle angeführt, welche die Wirkung illustrieren. Misslingen ist das Resultat von Sorglosigkeit und Unerfahrenheit. Ursachen, welche die Genauigkeit der Probe abschwächen. Die Pennsylvania-Methode in Bezug auf die Verfügung der reagierenden Rinder. Abnahme in letzten Jahren des Prozentsatzes von Reaktionen in geprüften Herden in Pennsylvania.

Die Häufigkeit der Respirationen gab ebenfalls wertvolle Auskunft. Von den anderen Momenten konnte man keine positiven Schlüsse ziehen.

Die älteren Kinder gaben etwas bessere Resultate als die jüngeren, und die in dem Sanatorium behandelten waren besser daran als die ambulant oder im Spital behandelten Kinder.

Die Resultate in den Kindern waren besser als in den Erwachsenen, wenn die Krankheit nicht so ausgedehnt war, aber nicht so gut in den vorgeschrittenen Fällen.

DISCUSSION.

PROF. ARLOING: Tuberculin is an almost absolutely reliable agent for the diagnosis of tuberculosis. The reaction caused by tuberculin must be regarded as indicating positive lesions of tuberculosis. It does not sometimes produce a reaction in tuberculous animals, the causes of which are the very extensive lesions in the animal. In cases where animals fail to show any lesions after giving a reaction to the tuberculin, it does not indicate necessarily the absence of the disease in the animal. We have a wrong impression of tuberculosis. The presence of the disease is usually only conceived by the macroscopical lesions, but there is also a microscopical tuberculosis which has been and can be demonstrated by animal inoculations. Moussu, Arloing, and Heyman's experiments prove that tubercle bacilli placed in a capsule and introduced into the body of an animal will give a reaction to tuberculin. If an animal is injected with tuberculosis and is killed fourteen days after artificial infection, it will show no macroscopical lesions, yet such an animal would react to the tuberculin test before slaughter, thus showing that while the disease exists in such an animal, there are no visible lesions present in any of the organs. It is therefore necessary to recognize the microscopical cases of tuberculosis, and all cases which react to the tuberculin test and which do not show lesions may be accepted as affected with the microscopical form of the disease. The tuberculin test is absolutely reliable in all reacting cases, and animals which react should be considered as being affected with tuberculosis.

TUBERCULOSIS:

A REPORT OF THE RESULTS OF THE CONTINUED INJECTIONS OF TUBERCULIN UPON TUBERCULAR CATTLE.

By S. B. Nelson,

Veterinarian, Washington Experiment Station.

The treatment of tuberculosis in the human family by the subcutaneous injection of tuberculin has received very considerable attention by the medical profession during the past decade. As to the value of this form of treatment there appears to be a wide difference of opinion among physicians. Some have given up the use of tuberculin entirely, believing it to be of negative value; while others claim for it that, with the better knowledge obtained through its increased use, the results are constantly better and more encouraging.

It was through the observance of this work in the human family that the veterinary department of this station planned a series of experiments to study the effect of subcutaneous injections of tuberculin into cattle under the conditions under which they are generally kept; that is, a fairly well-kept stable in the winter-time, being outdoors a part of the day-time, and a run to pasture during the summer months, being kept in the barnyard at night during this time.

The first series of experiments were carried on during the year 1900, and the second series during 1903–07. The first experiments were carried on with Jim, a four-year-old Jersey bull, and Lora, a three-year-old grade Holstein-Jersey heifer. The object of these experiments was to observe the action on these animals of continued injections of tuberculin. The action of the injection was to be observed through the temperature of the animals, their general appearance, and a study of the post-mortem lesions.

These two animals were tested with the other animals in the herd March 1, 1900, giving the following reactions:

March 1st and 2d.		A. M.	P. M.		A. M.			P. M.				
		10	2	10	7.30	9	11	1	3	5	7	10
Lora 2 c.c.	10 P. M.	102°	101.4°	101.4°	103°	105°	105°	104.1°	102.2°	102.2°	102.3°	101.3°
Jim .2 c.c.	10 P. M.	100.1°	100.3°	101°	101°	102°	103.3°	105.4°	106°	103.4°	103°	102.1°

They were retested April 9th and 10th, May 4th and 5th, and May 21st and 22d.

April 9th and 10th.		P. M.			A. M.				P. M.			
		2	7	10	6	8	10	12	2	4	6	8
Lora 2 c.c.	10 P. M.	102°	102°	102.1°	101°	102°	102°	102°	102°	101.2°	102°	101.4°
Jim .2 c.c.	10 P. M.	101.3°	101.2°	100.1°	102°	101.4°	102°	102°	102°	101.3°	101.3°	101.2°

May 4th and 5th		A. M.		P. M.		A. M.			P. M.		
		8	12	5	10	7	9	11	1	4	8
Lora ....3 c.c.	10 P. M.	101°	101.3°	103°	102.4°	102°	101.6°	101.4°	101.4°	102.2°	101.4°
Jim .....3 c.c.	10 P. M.	100°	100.8°	101.6°	101.5°	100.6°	101.6°	100.3°	101.2°	101.2°	101.2°

May 21st and 22d.		P. M.			A. M.			P. M.		
		12	5	10	8	10	12	2	4	6
Lora .....3 c.c.	10 P. M.	101.4°	102.4°	102°	99.6°	101.2°	102.8°	102.2°	102°	101.8°
Jim .....3 c.c.	10 P. M.	101.2°	101.2°	100.8°	98.6°	100.8°	100.8°	100.8°	100.8°	100.6°

The original test of March 1st and 2d was considered a typical tuberculin test, while the three tests following were not so considered, even with the injection of 3 c.c. in the last two. It was nevertheless decided to continue the injections of constantly increasing doses of tuberculin as previously indicated. In both animals the temperature was taken three times daily during the experiment.

Lora was given the following injections:

June	10th	2 c.c.	tuberculin
"	17th	3 c.c.	"
"	23d	4 c.c.	"
"	27th	5 c.c.	"
July	5th	6 c.c.	"
"	10th	7 c.c.	"
"	14th	8 c.c.	"
"	18th	9 c.c.	"

A study of the temperature chart shows an observable difference between the morning and evening temperatures, that of the evening averaging 0.6 degree higher than the morning one. The average temperature on the day after each injection is generally lower than the corresponding average of the day before the injection. There is very little difference between the average temperatures of the three days immediately preceding and following the injections.

Lora was killed August 29, 1900. She was in fairly good flesh when killed. Post-mortem examination showed the mediastinal glands filled with calcified tubercular nodules. The caudal extremity of the left lung was filled with a number of small caseated tubercles. No new foci of infection were found.

Jim received injections as follows:

June	10th	2 c.c.	tuberculin
"	17th	3 c.c.	"
"	23d	4 c.c.	"
"	30th	5 c.c.	"
July	7th	6 c.c.	"
"	14th	7 c.c.	"

In Jim's case the evening temperature was 0.4 degree higher than the morning temperature; 0.2 degree less difference than was found in Lora. The general temperature of Jim ran about 0.5 degree lower than it did in Lora.

There is no constant difference between the average temperature of the day before and the day after the injection. The same holds true of the average temperature of the three days immediately preceding and following the injection. The average temperature of the week after the last injection is the same as that of the week after the first injection. Jim was killed the same day as Lora. Post-mortem lesions found were a few small caseated miliary tubercles on the left pleural surface and one on the pericardium; the animal was otherwise healthy.

Without doubt on March 1st, when these two animals were first tested, they were affected with tuberculosis, possibly in a very slight degree, and the lesions were primary in character at that time. Probably after this test the lesions began to become caseous, the acute form of the disease passing into a more or less chronic form, a possible recovery gradually taking place, and therefore at the following three tests a typical reaction was not obtained. Because of this probable recovery and absence of the tubercle bacillus the repeated injections of the constantly increased doses of tuberculin failed to give any appreciable rise of temperature at any time during the experiment.

The next series of experiments were planned along more extensive lines. The animals experimented upon consisted of eight cows and one bull. They were all registered Jerseys, with the exception of one cow, which was a grade Jersey.

The series included four experiments, as follows:

Experiment 1.—Including cows Nos. 52 and 53 and bull No. 48. To test the injection of 2 c.c. of tuberculin and doubling the doses monthly. The temperature to be taken every night and morning, with the exception of the day after the injection, when it is to be taken every two hours.

Experiment 2.—Including cows Nos. 49 and 51. To test weekly injections

of tuberculin, beginning with 2 c.c. and weekly adding 1 c.c. Temperatures to be taken the same as in Experiment 1.

Experiment 3.—Including cows Nos. 54 and 55. To test the injection of tuberculin, beginning with a weekly injection of 2 c.c., lessening the period one day between each succeeding injection until it becomes daily, then increasing the dose 0.5 c.c. daily. The temperature to be taken each night and morning, with the exception of once weekly, when it is to be taken every two hours.

Experiment 4.—Including cows Nos. 50 and 56. To test the injections of tuberculin, beginning with 0.5 c.c., continuing the injections whenever the temperature was normal, but increasing or decreasing each succeeding dose so as not to increase the temperature; if possible, to prevent it.

These animals had been tested with tuberculin and reacted, and the owner, not wishing to be troubled with keeping them separated from his other cattle, decided to send them to the experiment station for experimental purposes. They were retested December 9 and 10, 1903, at which time they all gave very typical reactions. They were placed in the experiments December 12, 1903.

Experiment No. 1. Monthly Doubled Injections.

In experiment No. 1 cow No. 53 received the first injection, of 4. c.c., January 14, 1904, and the last, of 8 c.c., February 13th. She was destroyed March 5th.

To both injections she gave decided reactions. For several weeks prior to this animal's death she had been gradually growing weaker. She showed quite marked symptoms of enteritis. Great dullness, accompanied at times with exhibitions of pain; pulse weak; respirations rapid and catching; appetite, however, fairly good, but not regular. On the 28th of February she, with the others, had been turned out to pasture. The weather became rainy and cold, and this animal was so chilled and exhausted that she could not return to the stable that evening, but was hauled in early the following morning.

March 5th she was so weak that it was deemed best to destroy her. Post-mortem held immediately.

Lungs normal except a few lesions of lobular pneumonia.

In the intestines were found several tubercular ulcers, some of them penetrating the jejunum.

About ten of the mesenteric lymph-glands were tubercular and quite calcareous. The lymph-glands in general showed evidence of great emaciation, being deeply pigmented and watery in the center.

The peritoneum on the left side was normal, but on the right side it showed marked chronic peritonitis. The membrane was 4 cm. thick in

many places, and liquefactive necrosis was in progress. The peritoneal cavity contained about 4 liters of foul-smelling liquid.

Cow No. 52 received her first injection, of 4 c.c., on January 14, 1904, and the last, of 2048 c.c., on November 25, 1904. She died April 10, 1905, being found dead in her stanchion after she had eaten a feed of green grass.

She was greatly bloated, and her death was in all probability due to tympanites. She was in fairly good condition and had a thrifty appearance. The lungs contained a few old tubercular foci. The post-pharyngeal, bronchial, anterior and posterior mediastinal glands were tubercular and were passing into the stage of calcification. All other tissues and glands were normal.

The bull No. 48 received tuberculin injections the same as cow No. 52, but because of his vicious temper it was deemed advisable not to try to take his temperature, as was done with the cows. There is therefore no temperature record in his case.

This animal was in good condition when he was put into the experiment. He had absolutely no physical symptoms of tuberculosis. He was given a shed stall and paddock to run in and was well fed during the entire experiment.

In October, 1904, he began to show external symptoms, such as lameness, swelling of the shoulder-joints, rough, staring coat, occasional diarrhea. From this time on he failed rather rapidly, and when he was killed, September 19, 1905, he was unable to get to his feet when down. Post-mortem lesions.

In general ante-mortem appearance the animal was very emaciated, the skin was rough, and the coat stary. Post-pharyngeal lymphatics were greatly enlarged, tubercular, and calcareous. The left axillary and prescapular glands were tuberculous, as were the small supernumerary glands of the anterior mediastinum. The portal lymphatic was tuberculous. Several of the small gastric and nearly the entire chain of mesenteric glands were also tubercular.

The bronchial and mediastinal glands were extensively diseased.

Nearly all parts of the lungs contained tubercular foci. Neither the pleura nor the pericardium was involved.

In the liver were a number of quite large tuberculous nodules. The intestines contained ulcers, evidently tubercular in character.

One nodule was found on the left kidney.

No. 52 gave reaction to the following injections:

Jan. 14, 1904, 4 c.c.	102.7°	105.3°	105.4°	105.1°	105.5°
Feb. 13, " 8 c.c.	102.3°	104°	104.2°	103.7°	102.9°
Mar. 13, " 16 c.c.	103.5°	103°	102.8°	102.4°	102.1°
Apr. 14, " 32 c.c.	101.4°	102.1°	102.2°	102°	101.6°

The April record would hardly be considered a reaction, and none occurred after that date.

It is rather interesting to note that during the early part of the experiment the morning temperature of both Nos. 52 and 53 was higher than the evening one. In No. 52 this was true during the first six months, or up to the time she had received 32 c.c. of tuberculin at that injection. From that time until the last injection, of 2048 c.c., the temperature in the evening averaged higher than in the morning. During the last four months her temperature ran more irregularly. It would sometimes go to 103° to 104° for a day and then drop to 99° to 100°.

The evidence in these three experiments tends to show that in Nos. 53 and 48 the results were negative, while in No. 52 the injection may possibly have had beneficial action.

Experiment No. 2. Weekly Injections Adding 1 c.c.

In experiment No. 2 cow No. 49 received her first injection, of 2 c.c., on January 3, 1904, and her last injection, of 16 c.c., April 17th of the same year.

She gave a reaction of 103° to every injection. She was very poorly nourished, hair rough and staring, mucous membranes anemic, pulse and respirations rapid.

Post-mortem lesions found were:

Anterior middle lobe of right lung completely solidified and filled with tubercles varying in size from 1 to 5 cm. Lower two-thirds of posterior lobe also filled with tubercles. In the left lung was found the same condition as in the right, except to a less degree. The tubercular foci were nearly all calcareous.

The udder contained tubercular foci that had undergone calcification.

On the surface of the omasum there was one tubercle about 1 cm. in diameter, filled with calcareous material.

The external inguinal, superior mammary, mesenteric, portal, and bronchial glands were all affected, the latter being greatly enlarged and calcareous. The anterior and posterior mediastinal glands were also affected.

Cow No. 51 was always in good flesh and condition up to the time she was destroyed, July 8, 1907. A very careful examination gave no macroscopical evidence of any lesions of tuberculosis, which makes this case a very interesting one. The following preliminary tuberculin test was considered a characteristic one:

	A. M.				P. M.		
	6	8	10	12	4	6	10
Dec. 9, 1903	..	..	97.1°	98.4°	101.3°	..	101.6°
Dec. 10, 1903	100.5°	102°	103°	104.3°	104.5°	103.2°	..

From January 3, 1904, when she was injected 2 c.c. of tuberculin, until June 13, 1904, when the injection had been increased to 25 c.c., she gave rather irregular and indefinite temperature reactions. From June 13 to December 26, 1904, with the gradual increase in the injections to 48 c.c., her temperature at no time went above 102.8°, giving no reaction. From January 7, 1905, to January 1, 1907, when she received 150 c.c. of tuberculin, she gave quite characteristic reactions.

	A. M.			P. M.	
	8	10	12	2	4
Jan. 14, 1905, 51 c.c.	102.5°	103.7°	104.2°	104.1°	104.8°
Feb. 10, " 55 c.c.	100.2°	102.2°	103.3°	103.4°	102.6°
Feb. 25, " 57 c.c.	101.6°	102.7°	102.6°	105.6°	105°
Mar. 18, " 60 c.c.	101°	101.5°	102.8°	105°	105.7°
May 26, " 70 c.c.	101.3°	102.4°	102.8°	103.8°	103.6°

These, I think, are fair examples of how the weekly tests ran. Some ran higher and some lower than these. From January 1, 1907, to May 28, 1907, there was no reaction whatever to any of the injections.

It is probable that this cow had tuberculosis to a very slight extent when she was first tested, and recovered by June 13, 1904, to become reaffected by January, 1905, because of her confinement with the other tubercular cattle during the earlier winter months, and again recovering by January, 1907; and yet we were not able to find any traces of pathological lesions. Is it possible that the disease could exist to a sufficient extent to give the temperature reactions and yet not form the usual lesions because of the large amounts of tuberculin continually kept in the animal's body? or was the reaction an error the greater part of the time?

It seems most reasonable to believe that the animal subjected to continual exposure by being kept in the stable in close contact with the other extensively diseased animals was continually being infected, and the large doses of tuberculin prevented the development of the pathological lesions.

In this experiment with these two cows the temperature shows entirely opposite conditions as to the relation between the morning and evening temperatures. In No. 49 the morning temperature, with the exception of just a few mornings, exceeded the evening temperature. This is rather unusual in this disease. While in No. 51 there was marked exacerbation of the evening temperature.

The injection of the tuberculin as carried on in this experiment may have had therapeutic value in both of these animals. In No. 49 the lesions were to a marked extent calcified, showing that a strong recuperative force was present. In No. 51, if it was of value, it was probably prophylactic in character.

Experiment No. 3. Daily Injections.

In experiment No. 3 cows Nos. 54 and 55 received their first injections, of 2 c.c., on January 3, 1904, and the last one, of 48 c.c., on June 13, 1904.

No. 55 was killed June 15, 1904. She was so weak and emaciated that it was thought advisable to kill her. She had been suffering from diarrhea for about a month, which at times was so severe that the feces were smeared with coagulated blood.

Post-mortem lesions found immediately after death were that the lungs contained a few tubercular lesions; here and there on the pleura were a few pearly tubercles; the bronchial lymph-glands were greatly enlarged and contained calcareous nodules in large numbers; the posterior mediastinal gland was also much enlarged and extensively affected; the intestines showed enteritis, but no definite tubercular lesions; all other organs were apparently healthy.

Cow No. 54 was killed July 7, 1907. This animal was in a thrifty condition, as was evidenced by the flesh she was in and by the appearance of her coat. She was suffering from a slight leukorrhea due to local vaginitis.

Post-mortem lesions found were tubercular lungs, pleura, intestines, liver, and lymphatics. The anterior and inferior lobes of the right lung contained many tubercles, and the diaphragm was covered with quite a number of them over the affected part of the lung. The small intestines contained in their wall a number of calcified abscesses. The same was true of the liver, where there were fifteen or twenty calcified tubercles on its surface. All of the lymphatics had calcified tubercular lesions in them.

In both of these cows the temperature chart showed that from the beginning of the experiment to the time the injections were discontinued the temperatures ran very irregularly. There was no definite relation between the morning and evening temperatures.

During the first month of the experiment, that is, up to the date that 7 c.c. were injected, the weekly two-hour temperature record shows reaction to the injection. At no time after that is there any indication of any reaction, except that on June 4th, after the injection of 43.5 c.c., both animals showed a rise in temperature. From June 13, 1904, to May, 1907, No. 54 ran quite a regular weekly temperature—practically the normal temperature of a healthy cow.

In both of these cows the lesions were old and calcareous. No fresh centers of infection were found in either one of them, although in No. 55 the enteritis, diarrhea, and high temperature during the last three weeks might have indicated enteric tuberculosis.

The cessation of reaction seemed to show that the injections had had positive influence on the disease, or that the large daily injections had so filled the animal's body with tuberculin that reaction from the next injection

was impossible; but the additional evidence of the chronic lesions found would point toward the positive influence of the injections in this experiment.

Experiment No. 4. Small Fluctuating Injections.

Cow No. 50 was in very good flesh up to within three months before she died, July 21, 1905. This breakdown in condition began soon after she calved, March 9, 1905.

Post-mortem lesions: The lungs were extensively affected, showing many foci involving large areas. There were also countless numbers of miliary tubercles, indicating either that the old local lesions had given rise to generalized tuberculosis or that she had become reinfected. The indications are that it was from the former, as all the organs and glands, lungs, liver, spleen, diaphragm, mesentery, uterus, and udder, were all extensively affected, as well as all the lymphatic glands. The posterior mediastinal was about 25 cm. in length. This was one of the severest cases of generalized tuberculosis that has come under our observation.

Until in February, 1905, she did not give any appreciable reaction to the injection of small doses, but subsequent to this time, with double the amount of tuberculin, she would continually run to 104° to 106°. On April 11th she showed an evening temperature of 104.7°; this was the beginning of her very high evening temperatures. At first, from April 11th to May 11th, this high temperature only occurred weekly, but from May 11th to the day she died her evening temperature was constantly very high.

Cow No. 56 had for some little time been quite poor in flesh, and just before her death she was extremely emaciated.

Post-mortem: On the right side of the neck, between the skin and fascia, there was a small tubercular nodule. The lungs were extremely tubercular. They contained in some places broken-down areas with cavity formation containing broken-down tissue and pus. The entire chain of lymphatics was diseased. The small intestines, especially the ileum, contained tubercular ulcers. The liver, spleen, pleura, pericardium, and udder were apparently healthy.

This animal showed from the first of the experiment an increased evening temperature, but after May 10, 1905, she constantly presented an increasingly high evening temperature, although her morning temperatures were nearly always normal. During the last three days that she was alive her temperature was subnormal, at no time reaching 99°.

In this experiment of using small doses of tuberculin the original plan was slightly deviated from, in that toward the end of the experiment the dose of tuberculin injected was kept at 2 c.c. nearly all of the time, and each injection resulted in a rise of temperature, when the dose should have been so varied as to have prevented the rise of temperature, if possible.

In both of these animals the weekly injections of what is considered a normal dose of tuberculin constantly gave a typical reaction. The rise of temperature, however, began very soon after the injection, reaching its maximum in six to eight hours, instead of waiting six to eight hours before beginning to rise, and then not reaching its maximum before fourteen to eighteen hours.

In these advanced cases of tuberculosis small continued doses of tuberculin did not exhibit any positive therapeutic value.

Conclusions.

1. The injection into tubercular cattle of large monthly or small weekly doses of tuberculin does not have therapeutic value.
2. The injection of constantly increased daily or weekly doses of tuberculin does have therapeutic value.
3. The evening temperature is usually higher than the morning temperature in tubercular cows.
4. The oftener tuberculin injections are made into tubercular cattle, the sooner the temperature reaction begins and the sooner the zenith is reached.

Report sur les Résultats d'Injections continuelles de Tuberculine au Bétail tuberculeux.—(Nelson.)

Les présentes investigations s'étendent sur une période de plus de cinq ans. Dans un troupeau de bétail tuberculeux onze animaux typiques furent choisis; ils furent divisés en quatre groupes. On fit au premier groupe une injection de tuberculine chaque mois, en doublant la dose à chaque injection, jusqu'à ce que chaque animal eût reçu plus de deux litres à la fois.

On fit au second groupe une injection par semaine, en augmentant graduellement les doses, mais en restant à des doses relativement petites. Le troisième groupe reçut tous les jours des injections croissantes. Le quatrième reçut toutes les semaines de petites quantités changeantes selon le progrès de la maladie.

L'auteur conclut de ces expériences que de grandes doses mensuelles ou de petites doses hebdomadaires de tuberculine n'ont pas de valeur thérapeutique, tandis que l'injection de doses augmentant constamment tous les jours, ou toutes les semaines, semblent donner de bons résultats.

Il trouva que la température du soir des animaux ayant reçu l'injection était plus haute que la température du matin et que, plus souvent on fait les injections, plus tôt après l'injection la température commence à monter. L'auteur recommande, en conséquence, que, là où les animaux reçoivent les injections fréquemment, on les fasse de préférence le matin.

Bericht über die Resultate fortgesetzter Injektionen von Tuberkulin auf tuberkulöses Rindvieh.—(NELSON.)

Diese Forschungen über den möglichen therapeutischen Effekt von Tuberkulin-Injektionen auf tuberkulöses Rindvieh erstrecken sich auf eine Periode von fünf Jahren. Aus einer Herde von tuberkulösem Rindvieh waren elf typische Tiere ausgewählt worden. Sie waren in vier Gruppen eingeteilt worden.

Die erste hatte eine Injektion von Tuberkulin jeden Monat erhalten, wobei die Dosis einer jeden Injektion verdoppelt wurde, bis jedes Tier über zwei Quart Tuberkulin zur selben Zeit erhalten hatte. Die zweite Gruppe wurde einmal in der Woche mit nach und nach ansteigenden, aber verhältnismässig kleinen Dosen injiziert.

Die dritte hatte täglich grösser werdende Injektionen. Die vierte erhielt wöchentlich kleine fluctuierende Quantitäten, wie sie durch den Fortschritt der Krankheit indiziert waren.

Dr. Nelson zieht die Schlussfolgerung, dass grosse monatliche oder kleine wöchentliche Dosen von Tuberkulin keinen therapeutischen Wert haben, während die Injektion ständig anwachsender täglicher oder wöchentlicher Dosen dem Tier wohl zu tun scheint.

Er fand, dass die abendliche Temperatur injizierter Tiere für gewöhnlich höher war als die morgendliche, und dass je öfter die Injektionen gemacht werden, desto schneller nach der Injektion die Temperatursteigerung beginnt. Er empfiehlt daher, dass, wo die Tiere häufige Dosen erhalten, sie am Morgen injiziert werden.

DISCUSSION.

DR. CONNAWAY: With reference to Dr. Nelson's paper, I do not believe that his conclusions regarding the therapeutic value of tuberculin are justified, owing to the small number of animals used in his experiments. It seems that a positive conclusion should be based on more extensive work, to get a therapeutic value which can be put into practice. Moreover, I think that along with these experiments check animals should have been used, in order to see if other animals under similar conditions might not have shown calcifications. I have seen calcifications in calves not more than three or four months old which had been infected for only a few weeks. I believe Dr. Schroeder will bear me out in this statement.

DR. SCHROEDER: I think it is very doubtful if we can tell the age of lesions. I have observed, however, calcified lesions in a case of congenital tuberculosis in a calf five days old.

DR. NELSON: I intended to direct attention to these points, but not to attempt to make them positive conclusions.

DR. MEYER: When this great triennial congress shall have adjourned, it will be found that its most important pronouncement will be, "educate the masses." However backward Louisiana may be in exhibits and public sanitation, she is at least a pioneer in insistence on this necessity. The whole scheme of the Louisiana system of hygienic education is based on two principles:

First: The necessity of instructing the masses in the cause and prevention of all contagious and infectious diseases, and especially of those common to man and domestic animals, like tuberculosis.

Second: The duty of the State to furnish this instruction; this duty is apparent not only from a humanitarian standpoint, not only because under free governments men have and claim an inalienable right to life, liberty, and the pursuit of happiness, these being inseparable from the "mens sana in corpore sano," but from an economic point of view, because it is cheaper to prevent than to cure or take charge of the human physical derelicts as they float on the waters of life, a menace to every other object they meet. This system had its inception in 1878, was tentatively tested in 1884, and shown to be practical in a popular institute of hygiene held in Apelousas in 1897, when for seventeen consecutive years the attention of a lay audience was held without a break in the continuity of interest, the subject discussed being tuberculosis, typhoid and yellow fever, variola, etc. This system correlates all educational factors—medical, veterinary, legal, commercial, industrial, editorial, and clerical, the latter the most important, on account of their wide range of influence. In practice we have found the illustrative lecture the most popular form of conveying the instruction, and by its use we converted a people wedded for a century to the fomites stelluric origin of yellow fever to the mosquito doctrine of transmission. No popular institute of hygiene will be a success without appropriate musical numbers to relieve the strain on the lay mind. The charter of our State Sanitary Association, chartered in 1897, besides providing for the education of public opinion on all health matters, also provides for "the restriction and prevention of tuberculosis and the founding of sanitaria for its hygienic-dietetic treatment" (sec. 6). The State Medical Society in 1894–05 adopted resolutions placing themselves in line; the Agricultural Department for ten years included hygiene of home and farm in the curriculum of their institutes. The State Legislatures of 1900 and 1902, by handsome majorities, passed a measure designed to put in operation a great scheme of hygienic education which was twice vetoed by the governor, who failed to grasp the humane and economic value of the measure.

SECTION VII.

Tuberculosis in Animals and its Relations to Man (*Continued*).

SIXTH SESSION.

Thursday Afternoon, October 1, 1908.

CONTINUING THE DISCUSSION OF THE DIAGNOSIS OF TUBERCULOSIS IN ANIMALS.

The Section was called to order by the President, Dr. Leonard Pearson, at half-past two o'clock.

RAPPORT DE COMMISSION DE L'OPHTALMO-REACTION.

RAPPORT PRÉSENTÉ AU NOM DE LA SOCIÉTÉ DE PATHOLOGIE COMPARÉE.

PAR LE DR. BAILLIART,
Paris.

Au mois de Décembre dernier, au nom de la Commission spéciale nommée par la Société de Pathologie Comparée, j'ai présenté dans mon rapport les conclusions que nous crûmes devoir adopter à la suite de l'étude qu'avait faite, après d'autres auteurs, deux de nos collégues MM. Jugeat et Morel, Vétérinaires Sanitaires de la Seine. Mais la question ne nous paraissant pas à ce moment définitivement tranchée, nous avons invité nos confrères à poursuivre leurs recherches. Nous résumerons ici, dans ce nouveau rapport, à la suite de leurs premiers travaux les résultats de leurs secondes expériences.

Les premières observations de M. Jugeat ont porté sur 63 animaux appartenant à six exploitations différentes; chaque sujet a été éprouvé successivement par l'ophtalmo-réaction puis par la tuberculination ordinaire.

M. Jugeat divise les réactions obtenues du côté de l'oeil en trois classes:

Les *réactions légères* qui se traduisent seulement par un peu d'injection et d'oedème de la conjonctive.

Les *réactions moyennes* dans les quelles on voit se dessiner des arborisations vasculaires sur le globe de l'oeil; en même temps on constate un peu d'oedème et d'injection du corps clignotant et un peu de larmoiement.

Les *réactions fortes* enfin, où tous les caractères précédents s'exagèrent avec apparition de muco-pus dans le grand angle de l'oeil.

Les plus violentes de ces réactions ont d'ailleurs toujours paru à M. Jugeat, fugaces, sans aucune gravité.

Il est évident que de telles classifications ne présentent aucun caractère scientifique et que telles réactions classées par un observateur dans la première catégorie pourront être classées dans la 2 ème, ou pourront passer de la 2 ème dans la 3 ème ou inversement. Il y a là des difficultés d'interprétation très manifestes que M. Jugeat ne manque pas de signaler.

Dans l'établissement de sa statistique de succès ou d'insuccès, il a donc pris le parti de considérer comme négatifs tous les cas à réaction faible; une légère injection de la conjonctive peut, en effet, être produite par la simple irritation mécanique due à l'instillation du liquide. Il faut d'ailleurs reconnaître que les conjonctives oculaires et palpébrales sont normalement injectées chez bon nombre d'animaux.

Sur 63 animaux observés, M. Jugeat a obtenu 14 réactions fortes, 4 réactions moyennes, 14 réactions faibles et 31 réactions nulles. Ces réactions faibles, considérées au point de vue pratique, comme n'ayant point de valeur diagnostic, doivent être ajoutées aux 31 réactions nulles, ce qui nous donne, sur 63 animaux soumis à l'ophtalmo-réaction, 45 résultats négatifs contre 18 positifs.

Les 18 animaux ayant donné ce résultat positif à l'ophtalmo-réaction ont présenté une réaction nette à la tuberculination. Il y aurait donc à ce point de vue concordance parfaite entre les méthodes: tout bovin réagissant nettement à l'ophtalmo-réaction réagit à la tuberculination.

Voyons maintenant les résultats négatifs: 45 animaux n'ont pas réagi à l'ophtalmo-réaction, ou leur réaction a été si faible, que, pratiquement, M. Jugeat ne veut pas en tenir compte.

Sur ces 45 animaux ne réagissant pas à l'ophtalmo-réaction, 8 ont réagi nettement à la tuberculination: 37 n'ont pas réagi d'une façon plus que de l'autre.

Si nous groupons maintenant ces résultats, nous voyons que sur 63 expériences, il y a 55 fois accord entre les deux méthodes, et 8 fois seulement discordance (soit dans 13% des cas seulement) M. Jugeat arrive, en suivant la même méthode cependant à un pourcentage très différent d'insuccès, 28%. C'est que, considérant les réactions faibles comme très difficiles à

interpréter il les considère non seulement comme des insuccès, mais encore comme des cas de discordances, aussi bien lorsque la réaction thermique est positive que négative. Il m'a semblé très certain qu'il y avait là une erreur d'interprétation, et que si, de toute évidence, on pouvait tenir pour nulles les réactions faibles, on n'était nullement en droit de considérer comme discordants tous les cas où, quelle que fût la réaction à la tuberculination, la réaction oculaire était faible.

Dans la 2ème partie de sa communication, M. Jugeat envisage la question d'un autre point de vue. Plusieurs auteurs déjà, MM. Guerin et Lemaire, notamment avaient signalé que des sujets antérieurement soumis à l'ophtalmo-réaction, étant postérieurement tuberculinisés, présentaient du côté de l'oeil éprouvé une nouvelle reviviscence des symptômes oculaires, ou même leur apparition dans des cas où la simple ophtalmo-réaction avait été négative. Les résultats des expériences de M. Jugeat ont été très encourageants: apparition de réactions nettes chez des sujets qui, avant tuberculination, n'avaient pas réagi, transformation en réactions nettes, évidentes, de réactions primitivement faibles ou bâtardes.—Ces secondes expériences ont porté sur 30 animaux. Ces animaux ont d'abord été soumis à la simple ophtalmo-réaction, puis, huit jours après, à la tuberculination sans nouvelle instillation oculaire.

L'ophtalmo-réaction donnait comme résultats comparés avec les réactions thermiques ultérieurement observées après tuberculination:

20 concordances.

2 discordances,

8 cas douteux.

L'observation des yeux des mêmes animaux, après tuberculination, 8 jours après toute instillation de tuberculine fournissait des réactions telles que les résultats donnés cette fois étaient les suivants:

28 concordances,

2 cas douteux.

Pas un seul cas nettement discordant.

Dans une première série de travaux, M. Morel a expérimenté de son côté sur 78 vaches provenant de différentes vacheries de la banlieue parisienne. Comme M. Jugeat après instillation de tuberculine dans l'oeil il a, quelques heures après, procédé à la tuberculination. Alors que M. Jugeat employait de la tuberculine brute de l'Institut Pasteur, diluée à $\frac{1}{10}$, à $\frac{1}{20}$, ou $\frac{1}{50}$, soit dans l'eau bouillie, soit dans le sérum physiologique, M. Morel a employé d'abord la tuberculine brute diluée au $\frac{1}{30}$ ou au $\frac{1}{20}$ dans l'eau distillée, puis a employé la tuberculine médicale Pasteur.

Ce choix de la substance à instiller ne paraît pas inutile; il a semblé à M. Morel comme à d'autres auteurs que des réactions trop violentes pouvaient suivre l'instillation de solutions concentrées. Il rapporte notamment

que, se trouvant un jour dans une vacherie où il pouvait expérimenter, n'ayant pas le temps de se munir d'un compte-gouttes, il versa directement dans les yeux des animaux une partie d'un tube de tuberculine diluée au $\frac{1}{30}^{e}$. Il y eut une apparition d'ophtalmie très violente, avec muco pus, larmoiement, gonflement de l'oeil et des paupières, symptômes qui persistèrent une dizaine de jours. M. Morel mit sur le compte de cette "ophtalmie tuberculinique" des symptômes généraux que présentèrent les animaux atteints tels qu'inappétence, faiblesse et diminution de la sécrétion lactée.

Ne pourrait-on pas admettre aussi bien que les phénomènes généraux apparaissant chez des animaux soumis non seulement à l'oculo-réaction mais encore à la tuberculination, doivent être attribués à la réaction générale plutôt qu'à la réaction locale.

Les observations de M. Morel sont consignées en des tableaux si clairs et si précis, qu'il paraît inutile de les résumer: au bas de chaque table d'expérience il donne les résultats en accords et en désaccords.

Voyons donc sa récapitulation générale:

Sur 78 animaux soumis aux deux méthodes, 36 ont réagi, à l'oculo-réaction nettement. Les cas légers ont été classés comme douteux, et comme tels nous pensons qu'ils doivent être considérés comme négatifs. Il faut reconnaître, d'ailleurs que M. Morel n'a pas hésité à considérer comme douteux tous les cas où la réaction n'était pas très nette. Considérons donc dans l'étude des concordances et des discordances comme réactions nulles toutes les réactions douteuses. Sur les 36 vaches ayant réagi à l'oculo-réaction, 2 n'ont pas réagi à la tuberculination (ce premier résultat est en contradiction avec ceux des expériences de M. Jugeat). 42 ont réagi à la tuberculination, et sur ce groupe de 42 tuberculeuses d'après cette épreuve, 4 n'avaient pas réagi à l'ophtalmo-réaction.

Il y a eu 11 cas douteux (au point de vue de l'oculo-réaction).

Sur ces 11 animaux, 5 ont réagi à la tuberculination.

Comme discordances, nous trouvons donc (en considérant comme réactions nulles, les réactions douteuses, malgré tuberculination constatée), 9 animaux réagissant à la tuberculination sans réagir à l'ophtalmo-réaction et 2 ayant réagi à l'ophtalmo-réaction sans réagir à la tuberculination soit 11 discordances sur 67 accords; il y a eu entre les méthodes discordances dans 14% des cas. Ce chiffre de discordances est très sensiblement identique à celui que nous obtenions en analysant de la même façon les résultats de M. Jugeat (13%). M. Morel, cependant, donne une autre proportion 78% de concordances et 7% de discordances. Cela tient à ce qu'il néglige dans sa statistique les cas douteux, dont il est cependant impossible de ne pas tenir compte; comme je l'ai déjà dit, il me paraît absolument évident que les cas douteux doivent être pratiquement et théoriquement considérés comme des réactions négatives, et que nous devons cependant en tenir compte.

14% de discordances d'après les expressions de M. Morel, 13% d'après celles de M. Jugeat, on voit que l'écart n'est pas très grand entre les résultats obtenus par nos deux collègues. Tous les deux, comme la plupart de ceux qui ont étudié la question au point de vue vétérinaire, estiment que l'ophtalmo-réaction est une méthode infidèle, incapable de fournir une certitude ou même une présomption sérieuse. Le Professeur Vallée est bien loin de croire la méthode infaillible; il la considère comme "moins intéressante que la cuti-réaction, de recherche peut-être moins aisée, mais infiniment plus durable dans ses manifestations et moins favorable aux tentatives frauduleuses."

MM. Irr et Claude, à une des dernières Séances de la Société centrale de médicine vétérinaire rapportaient le résultat de leur expérimentation sur 57 bovins. Dans plusieurs cas, ils trouvèrent la méthode en désaccord avec l'épreuve de la tuberculine; tous les animaux cependant qui donnèrent une réaction oculaire donnèrent également une réaction à la tuberculination.

A la même séance, M. Lignieres rapportait le résultat de très intéressantes expériences: d'où il ressortait que si l'ophtalmo-réaction est souvent infidèle, en la combinant avec l'épreuve de la cuti ou de la dermo-réaction, on peut obtenir des résultats presque certains. M. Lignières emploie la tuberculine brute pure.

En médecine humaine, le nombre d'ophtalmo-réactions effectuées jusqu'à ce jour est considérable; on peut dire qu'il se chiffre par milliers. Les communications faites sur ce chapitre sont trop nombreuses pour que j'essaie de les résumer ici; je voudrais donner seulement quelques chiffres, résultats des plus récents travaux.

M. Comby a pratiqué l'ophtalmo-réaction sur plus de 300 enfants; il la considère comme un procédé infaillible pour diagnostiquer la tuberculose latente des enfants. Il emploie soit la tuberculine Calmette, soit la tuberculine Roux, à $\frac{1}{200}^{e}$.

M. Lesné l'a étudié sur 150 enfants. Il déclare les résultats parfaits. La solution qu'il emploie est à $\frac{1}{500}^{e}$. M. Letulle après une expérimentation sur 125 malades déclare que l'ophtalmo-réaction possède une grande valeur seméiologique dans la tuberculose pulmonaire de l'homme.

Au commencement de Juillet, M. Calmette et ses élèves avaient déjà 115 réactions personnelles; tous leurs sujets, enfants ou adultes, cliniquement tuberculeux avaient réagi. Il en a été de même pour certains malades atteints d'affections diverses chez qui la tuberculose n'était tout d'abord pas soupçonnée, mais qui, à un examen plus approfondi ont été trouvés porteurs de lésions suspectes.

MM. Dumarest et F. Arloing ont soumis à l'ophtalmo-réaction, à la tuberculine 41 tuberculeux pulmonaires provenant d'un sanatorium de la région lyonnaise. Sur ces 41 malades, 14 étaient au ler degré de la tuber-

culose, 20 au 2e et 7 au 3e; les auteurs ont employé la tuberculine Vicario à $\frac{1}{100}$e. Sur les 41 cas, l'ophtalmo-réaction a été 27 fois positive, 5 fois négative et 9 fois douteuse. Contrairement à ce que la plupart des expérimentateurs ont jusqu'ici observé, ce sont les malades du 1er et du second stade qui ont offert le plus grand nombre de cas douteux ou négatifs, alors que tous ceux du 3e degré ont réagi positivement. Quoi qu'il en soit, l'ophtalmo-réaction semble donc d'après ces expériences, bien loin de l'infaillibilité.

MM. Sougues et Cawadias ont recherché chez 15 malades adultes, indemnes de toute lésion tuberculeuse, d'abord la réaction générale fébrile (injection hypodermique de tuberculine) et ensuite l'ophtalmo-réaction. Chez 12 sur 15 il y a eu une réaction nette soit fébrile, soit oculaire. Mais, dans la moitié des cas, ces deux réactions n'ont pas concordé, la fébrile existant alors que l'oculaire manquait ou inversement.

M. de Massary sur une trentiane de cas a obtenu des résultats discordants. Dans un cas, où par trois fois, l'ophtalmo-réaction avait été positive, il trouva seulement une carcinose généralisée.

M. Mery a réuni 210 cas qui ne l'ont pas convaincu de la perfection de la méthode. Il insiste particulièrement sur 16 cas qui répondaient cliniquement à la tuberculose pulmonaire ou ganglionnaire dans lesquels l'ophtalmo-réaction a été négative.

Peut-être pourrait-on expliquer en partie les divergences dans les résultats constatés par les origines et les titres différents des tuberculines employées; tuberculine de Koch, tuberculine Billon, tuberculine Calmette, tuberculine médicale, toutes ont été utilisées.

Ce qui, peut-être, est plus important encore, c'est le titre de la dilution. M. Morel a remarqué que les réactions trop fortes qu'il obtenait au début ont disparu lorsqu'il n'a plus utilisé que la solution médicale de l'Institut Pasteur à $\frac{1}{100}$e.

M. Comby a renoncé à la solution Calmette à $\frac{1}{100}$e qui lui donnait des réactions excessives pour ne plus employer que la solution à $\frac{1}{200}$e. Nous avons vu que, plus prudent encore, M. Lesné s'adresse à une dilution à $\frac{1}{500}$e.

Bien d'autres travaux, bien d'autres communications mériteraient d'être résumés ici; toujours aux éloges que les uns consacrent à la méthode, nous pourrions opposer les reproches que les autres lui adressent. La tribune de l'Académie de Médecine a entendu récemment soutenir les deux thèses adverses, l'une par M. Delorme, l'autre par M. Calmette.

Quoi qu'il en soit, il ne nous paraît pas douteux que les résultats apportés jusqu'ici ne permettent d'affirmer que l'ophtalmo-réaction n'est pas infaillible. D'ailleurs, il est quelquefois difficile de dire où commence et où finit la réaction positive. Entre la réaction franchement négative et la réaction positive s'échelonne toute une gamme de cas que nos collègues ont dû interpréter et sur lesquels M. F. Arloing a particulièrement insisté.

Il semble, qu'après l'instillation oculaire trois sortes de cas peuvent se présenter.

Ou bien la réaction est franchment positive. Elle se caractérise par une rubéfaction intense des conjonctives bulbaire et palpebrale allant quelquefois jusqu'à un léger degré de chémosis. Cet oedème porte surtout sur la caroncule. En même temps, il y a du larmoiement et un peu de sécrétion mucopurulente. Quelques phénomènes subjectifs (photophobie, céphalée) rendent la réaction un peu douloureuse.

Le moment d'apparition de cette réaction est très variable. Elle est quelquefois très précoce, ayant son maximum d'intensité au bout de quelques heures. Plus rarement elle apparaît tardivement, quelquefois seulement au 4 ème jour.

Ou bien la reaction est franchement négative; dans les quelques heures et dans les quelques jours qui suivent l'instillation, aucun phénomène réactionnel n'est visible.

Ou bien enfin la réaction est douteuse.—L'oeil est un peu rouge, la conjonctive palpébrale surtout est légèrement injectée, la caroncule est plus rouge qu'à l'ordinaire. Un peu de muco-pus apparaît au grand angle de l'oeil, mais en si petite quantité que l'on se demande s'il ne s'agit pas d'un état banal. Ces cas douteux sont fréquents: sur 63 observations, M. Jugeat en trouva 14, sur 78, M. Morel en trouve 11. M. Fernand Arloing sur 41 malades tuberculeux trouvait 9 fois la réaction douteuse.

Peut-être, en analysant bien les cas, pourrait-on arriver à réduire le nombre de ces doutes? Pour avoir suivi les expériences de nos collègues sur les Bovidés, j'ai pu me rendre compte combien l'interprétation de pareils cas est difficile; observation dans des étables sombres, avec l'éclairage de fortune qu'on y peut rencontrer, mauvaise volonté de la part des animaux qui ferment les yeux dès l'approche de l'observateur. Il est vraisemblable de dire que beaucoup de conjonctivites légères observées dans de telles conditions sont dues, plus aux efforts de l'expérimentateur pour ouvrir les paupières qu'à l'instillation même de tuberculine. C'est pourquoi, il me paraîtrait absolument imprudent de tenir compte, en médecine vétérinaire, de ces cas douteux; il vaut mieux les considérer comme franchement négatifs.

L'observation chez l'homme et chez l'enfant est autrement simple: facilité de l'examen avant et après l'instillation en pleine lumière, comparaison facile, évidente même entre l'état des deux yeux. Cette comparaison de l'oeil éprouvé avec l'oeil indemne est une condition capitale de l'expérience; mais pour qu'elle soit tout-à-fait complète, il fraudrait prendre soin d'instiller, du côté opposé, une quantité semblable de la solution même qui a servi à la dissolution de la tuberculine, sérum physiologique le plus souvent. Il est banal, en effet, de voir certaines conjonctives beaucoup plus sensibles que d'autres, réagir violemment quelquefois à l'instillation d'une simple

goutte d'eau distillée. Cette réaction banale est d'ailleurs toujours passagère; elle apparaît immédiatement après l'instillation et quelle que soit sa durée, elle va en diminuant d'heure en heure. La réaction à la tuberculine, au contraire, n'est pas immédiate; si bien que, lorsqu'un oeil ayant été éprouvé au moyen de la tuberculine, n'étant plus rouge à la fin de la première heure, recommence un peu plus tard vers la troisième heure, ou plus loin même de l'expérience, à présenter quelques phénomènes de réaction, on est en droit, même si cette réaction est légère, de lui attribuer une valeur positive.

Quelquefois la réaction ne se produit pas seulement du côté instillé, mais encore, par une irritation reflexe, elle gagne l'oeil opposé.

S'il y a des cas trop légers, on en cite aussi de trop violents. M. Morel nous en signale où la réaction ne fut pas locale seulement, mais générale. MM. Dumarest et F. Arloing citent chez l'homme des cas analogues: lassitude, courbature, malaise générale vague avec céphalée diffuse; dans un cas même, ces observateurs virent apparaître des vomissements et de la fièvre. Mais ce ne sont là, fort heureusement, que des cas exceptionnels. Dans l'immense majorité des cas, l'ophtalmo-réaction ne s'accompagne d'aucun événement fébrile.

Reste un dernier côté de la question à envisager. Quels sont les dangers, pour l'oeil, de l'ophtalmo-réaction? Car il est évident que si l'instillation de quelques gouttes de tuberculine dans l'oeil pouvait déterminer du côté de cet organe des lésions oculaires ou autres, la méthode serait par avance condamnée.

En médecine Vétérinaire on n'a pas noté d'accidents graves: quelques faits analogues à ceux que M. Morel range sous le nom de "ophtalmies tuberculiniques"; gonflement énorme des paupières, sécrétion muco-purulente avec phénomènes douloureux et photophobie qui semblent indiquer une participation de la cornée aux phénomènes inflammatoires; voilà les seuls inconvénients que nos confrères vétérinaires ont pu relever à ce point de vue.

Il est vrai que de pareils faits ont pu leur paraître désagréables, et leur ont quelquefois attiré des reproches de la part du propriétaire, voire même de certains vétérinaires peu favorables à la méthode. Mais en somme, ces accidents ont toujours guéri au bout d'une dizaine de jours de soins légers; peut-être, en cherchant bien, trouverait-on quelque altération persistante et légère du côté de la cornée, telle que de légers leucomes; mais le fait est de bien peu d'importance qu'une vache laitière condamnée à passer à la boucherie en sortant de son étable, ait une vision quelque peu imparfaite. D'autant plus que, comme je l'ai dit, le fait n'est nullement démontré.

Il en serait tout autrement en médecine humaine: si l'ophtalmo-réaction peut amener dans quelques cas, si faible que soit le pourcentage, des altéra-

tions persistantes, mêmes les plus légères, elle est mauvaise et nous devons la rejeter.

On a rapporté pour l'homme, comme M. Morel l'a fait pour la vache, un certain nombre d'ophtalmies persistantes; quelques-unes mêmes ont inquiété les expérimentateurs et nécessité l'intervention de l'oculiste. Ces cas ne sont pas encore très nombreux. M. de Lapersonne vient d'en rapporter quelquesuns. Tous ceux que l'on a signalés d'ailleurs, sont légers: cas de kerato-conjonctivite bénigne disparaissant en quelques jours, un cas de conjonctivite purulente, quelques ulcéres marginaux de la cornée. M. F. Arloing a signalé le premier une certaine mydriase survenant à la suite de l'ophtalmo-réaction; cet auteur la considère, à juste raison, comme un symptôme absolument bénin qu'il met sur le compte de l'action vasodilatatrice de la tuberculine.

Dans sa Séance de Novembre 1907, la Société d'Ophtalmolegie de Paris a cru devoir s'occuper de la question. Dans une séance précédente, M. Kalt, Médecin des Quinze-Vingts, avait présenté un sujet atteint de scléro-kératite ancienne de l'oeil droit, avec synéchies iriennes, et à gauche, un foyer récent de scléro-kératite. Pas de signes généraux de tuberculose. Le traitement syphilitique ne donnant aucun résultat, l'oeil droit, l'oeil anciennement malade, dans lequel les lésions étaient absolument au repos, fut éprouvé au moyen de quelques gouttes de tuberculine à 1°/00. La réaction fut positive, décelant la nature tuberculeuse de l'affection; malheureusement, des phénomènes graves lui succédèrent, scléro-kératite intense, trouble de la cornée. La poussée aiguë dura un mois; après disparition des phénomènes inflammatoires, M. Kalt constata la persistance peut-être définitive du trouble cornéen.

A la même séance, M. Terrien rapportait l'observation d'une jeune fille de 18 ans qui lui fut amenée à la suite d'une ophtalmo-réaction positive (instillation de tuberculine Calmette à 1% faite plus d'un mois auparavant). La réaction persistait encore et de plus, on constatait sur la conjonctive tarsienne des paupières supérieure et inférieure, une petite éruption de tubercules confluents. La nature tuberculeuse de ces produits fut vérifiée par inoculation. Le point faible de cette observation est que le sujet n'avait pas été vu par un oculiste avant la réaction: il n'est donc nullement prouvé que cette tuberculose conjonctivale n'existait pas déjà, à l'état latent, avant l'ophtalmo-réaction.

D'autres faits, beaucoup plus légers, de simple persistance de réaction sous forme de kérátite bénigne, pourraient, je crois, être rapportés. De ce que nous en connaissons déjà, nous pourrions tirer les conclusions suivantes:

L'ophtalmo-réaction sur un oeil qui ne présente pas de lésions tuberculeuses, est toujours sans aucun danger ou ne produit que des lésions bénignes et négligeables.

La même réaction sur un oeil à lésions tuberculeuses, en évolution ou latente, peut exagérer ou réveiller ces lésions.

Mais de telles conclusions ne peuvent être encore définitives; il nous faut d'autres cas, plus nombreux, pour qu'elles puissent le devenir. M. Morax ne peut pas admettre qu'une tuberculine bien préparée, c'est-à-dire privée de bacilles vivants, puisse déterminer l'apparition de symptômes tuberculeux sur une conjonctive jusque là saine. Il ne croit pas que l'on puisse prétendre qu'il y a danger à instiller de la tuberculine dans un oeil déjà tuberculeux.

Il est certain que la tuberculine en injections sous-cutanées a déjà été employée, non comme moyen de diagnostic, mais comme procédé thérapeutique, par quelques oculistes. Je me souviens d'un cas observé chez M. Darier, où les injections sous-cutanées amenèrent une amélioration très notable d'une tuberculose de la choroïde, et ce cas est d'autant plus intéressant qu'aux injections sous-cutanées, M. Darier avait ajouté les injections sous-conjonctivales de tuberculine. L'action du produit, très dilué, il est vrai, était évidemment beaucoup plus directe qu'en simple instillation.

Enfin, dernier cas à rapporter, M. Rochon Duvigneaud ayant traité une irido-cyclite chronique tuberculeuse, rebelle à tout traitement, par les injections sous-cutanées de tuberculine, vit d'abord une aggravation des lésions pendant deux ou trois semaines, qui fut suivie d'une guérison complète de l'affection.

Plus récemment encore, au dernier Congrès de la Société Française d'Ophtalmologie (mai 1908) M. Aubineau de Brest n'a observé qu'une seule complication d'iritis, sur 69 malades qui soumis à l'oculo-réaction n'avaient jamais présenté aucune lésion oculaire.

Au contraire, sur 13 malades présentant ou ayant présenté différents accidents du côté de la vue, il vit survenir sept complications dont trois laissèrent après elles des troubles définitifs de la vue.

Nous avons rapporté ces quelques cas pour établir ce que nous disions tout-à-l'heure: puisque la tuberculine en injections sous-cutanées a pu produire des guérisons de lésions intra-oculaires, on ne peut pas prétendre d'une manière définitive qu'une simple instillation du même produit à la surface du globe oculaire, amène toujours une aggravation des lésions. Mais, cependant, des faits observés par des auteurs aussi compétents que M. Kalt nous obligent, jusqu'à nouvel ordre, à maintenir, comme provisoires, les conclusions que nous donnions tout-à-l'heure.

Nous en arrivons donc à cette conviction que si l'ophthalmo-réaction est souvent infidèle, elle n'est *que rarement* dangereuse lorsque l'oeil instillé est indemne de toute lésion tuberculeuse. Mais, au point de vue pratique, quels services en pouvons-nous attendre?

La question paraît jugée au point de vue Vétérinaire: d'un côté une méthode rarement en défaillance, celle de la sous-tuberculination; de l'autre, l'ophtalmo-réaction avec une proportion de 13 à 15% d'insuccès. Sans doute, des deux méthodes, la dernière est autrement facile; elle simplifie la technique opératoire, en supprimant les prises de température qui, de l'avis de tous les vétérinaires, sont des causes répétées d'ennuis et d'erreurs, elle effraie moins le porpriétaire, qui se prêtera toujours plus volontiers à une expérience aussi simple. Mais quelle confiance avoir en elle, si 15 fois sur 100, les résultats doivent être infidèles.

L'ophtalmo-réaction serait donc à rejeter; nos collègues MM. Jugeat et Morel sont parfaitement d'accord sur ce point et ce que nous avons vu de leurs expériences nous rapprocherait plutôt de cette manière de voir. D'autant plus que dans leurs dernières séries d'expériences, ces deux auteurs arrivent exactement aux mêmes conclusions: leur opinion n'a pas varié sur ce point. L'oculo-réaction, procédé de diagnostic facile et agréable, à coup sûr, n'a pas donné ce qu'on aurait pu espérer; ses résultats ne sont pas toujours concordants. Notre opinion ne saurait être différente de la leur: on ne peut que regretter qu'un moyen aussi simple ne puisse pas être en même temps un moyen sûr de diagnostic et il nous apparaît que la médecine vétérinaire l'abandonnera rapidement.

Les nouvelles expériences de nos collègues ont porté surtout sur un deuxième procédé, qui au mois de Décembre déjà, à la suite des travaux de M. Jugeat, bientôt confirmés par ceux de M. Morel nous semblait plein d'avenir.

Guérin pour les bovidés, Lemaire pour l'homme avaient signalé ce fait qu'une sous cuti-tuberculination réveille ou fait apparaître des réactions oculaires, si elle est faite quelques jours après l'oculo-réaction. A la Société de Biologie (séance du 12 Octobre 1907) Calmette, Breton et Petit avaient signalé le réveil de la réaction conjonctivale chez certains sujets sains ou tuberculeux, sous l'influence d'une injection sous-cutanée de tuberculine.

M. Jugeat reprenant ses expériences et cherchant à en tirer un moyen de diagnostic, dans une première publication au mois de Novembre dernier, donnait à la Société de Pathologie Comparée les résultats vraiment encourageants qu'il en avait obtenu. Depuis, poursuivant ses travaux, il a fait part d'une série d'expériences à la Société Centrale de Médecine Vétérinaire au Mois d'Avril dernier. Il nous a soumis enfin le résultat d'une nouvelle série d'expériences encore complétement inédites.

Son expérimentation a porté jusqu'ici sur 159 animaux. Notons en passant, pour ne plus y revenir, que l'oculo-réaction simple sur ces 159 cas lui donnait 27 discordances, soit 18% avec les résultats fournis par la tuberculination.

Au contraire, l'oculo-réaction seconde, apparaissant après tuberculination ne lui donnait plus que 13 discordances, soit seulement 8%.

Etudions de plus près ces discordances en nous occupant uniquement de la réaction oculaire secondaire. Pour plus de clarté, nous adopterons les formules schématiques de M. Jugeat qui permettent d'un simple coup d'oeil de comprendre le résultat positif ou négatif d'une réaction. Les discordances peuvent se produire suivant deux formules:

Ou bien la réaction oculaire seconde étant nulle, la réaction thermique se produit cependant. Dans ce cas, la formule est la suivante: 0″—th+

Ou bien la réaction oculaire existe sans réaction thermale, la formule devient 0″+th —

13 fois, M. Jugeat trouve 0″ + th —

3 fois, il trouve .....0″ — th +

Les tableaux seront d'ailleurs ultérieurement publiés intégralement dans un prochain Bulletin de la Société de Pathologie Comparée.

M. Jugeat conclut de ces expériences, que, à n'en pas douter, la réaction oculaire seconde est bien supérieure à la réaction oculaire simple, à la véritable ophtalmo-réaction, mais que ce procédé n'est pas infaillible, qu'il se trompe de deux façons: ou bien en laissant passer sans les signaler des animaux tuberculeux, ou bien en indiquant comme tuberculeux des animaux qui ne le seraient pas, le criterium étant dans tous les cas, l'épreuve de la tuberculination supposée infaillible. Ce qu'il en retient avant tout comme avantage pratique, c'est la grande simplification que le Vétérinaire hésitant quelquefois devant les prises de température, pourra en retirer.

Complétant les premières expériences qu'il avait faites après la communication de M. Jugeat, M. Morel apporte aujourd'hui de son côté le résultat d'une longue pratique de l'oculo-réaction seconde. Il reste évident pour lui que l'oculo-réaction simple est souvent infidèle et ne peut être érigée en procédé de diagnostic. Il en est tout autrement, à son avis, de la réaction oculaire qui suit la tuberculination. Dans une série de travaux encore inédits, qui ont fait l'objet de communications encore non publiées à la Société Centrale de Médecine Vétérinaire (décembre 1907 et février 1908), il apporte les résultats de 98 cas où il a pu employer le procédé.

Sur ces 98 animaux, 60 ont été reconnus tuberculeux par les deux procédés, examen de la température et réaction oculaire seconde, l'oeil étant exploré à la tuberculine quelques jours auparavant.

Sur ces 98 cas, il y a eu 7 discordances, à savoir:

2 fois la réaction thermale a eu lieu sans réaction locale,

5 fois la réaction locale s'est produite sans réaction générale.; soit 7, 5% environ de discordance.

Rappelons que les expériences de M. Jugeat donnent le chiffre de 8% et que cette similitude est d'autant plus intéressante à signaler que nous savons de source absolument sûre que tous deux ont toujours procédé dans leurs recherches parallèment sans que l'un pût connaître les résultats de l'autre.

L'un comme l'autre nous signale parmi les discordances, comme plus fréquente, la réaction locale apparaissant sans réaction thermale. Notons ce fait sur lequel nous aurons à revenir tout-à l'heure.

Les expériences de M. Morel l'amenèrent à conclure que l'oculo-réaction combinée est infiniment plus précise que l'oculo-réaction première, qu'elle peut apparaître chez des animaux n'ayant pas réagi à cette oculo-réaction simple, qu'elle est la règle chez les animaux devant réagir à la tuberculination.

Ce sont en somme, à peu de chose près les mêmes conclusions que nous apportent nos deux collègues.

Etudions donc, grâce à leurs intéressants travaux la question dans son ensemble. Certes ils nous apportent des éléments d'appréciation tout-à-fait remarquables, et nous ne saurions trop les en féliciter, tant par le grand nombre de leurs expériences que par l'esprit scientifique dont elles sont empreintes.

Aucun auteur ne peut, à notre avis, prétendre avoir plus qu'eux la pratique du procédé. Nous ne pouvons donc mieux nous en faire une idée qu'en analysant leurs travaux. Nous ne saurions cependant oublier d'autres travaux postérieurs aux leurs, mais intéressants cependant au plus haut point, comme celui de M. Vallée qui a paru dans la Revue de Médecine Vétérinaire du mois de Mars dernier.

Nous nous trouvons donc en face de 257 cas, soigneusement examinés au point de vue de l'oculo-réaction. A quelques divergences près sur des points de détail sur lesquels nous aurons à revenir, tous les animaux ont été traités de la même façon: instillation de tuberculine dans un oeil, l'autre étant pris comme témoin, puis 4 à 5 jours après, injection sous cutanée de tuberculine, et le lendemain examen des yeux. Sont considérés comme positifs tous les cas où la réaction est forte avec muco-pus.

Sur ces 257 cas, nos confrères nous signalent 20 discordances, c'est-à-dire que la méthode comparée à la tuberculination considérée comme pierre de touche a été dans 7, 8% faillible.

Analysons les cas de discordances: le désaccord peut se produire, nous l'avons déjà vu de deux façons: réaction locale positive avec thermo-réaction négative, ou réaction locale négative avec thermo-réaction positive.

Etudions le premier cas 0″ + th —; nous le rencontrons 15 fois, c'est-à-dire que sur 257 cas animaux, la réaction oculaire en indiquait 15 tuberculeux qui en réalité ne l'auraient pas été: nos confrères se seraient donc de ce fait trompés 6 fois sur 100.—Sur 100 vaches, il leur serait arrivé 6 fois d'être trop sévères.

Etudions le 2 ème cas 0″ — th + : nous le rencontrons 5 fois. Le procédé employé seul aurait laissé passer au crible de l'examen 5 vaches sur 257 alors qu'elles étaient tuberculeuses. Sur 100 vaches il y en aurait eu 2 qui, tuberculeuses n'auraient pas été reconnues.

Vraiment, le résultat est encourageant, car il nous importe relativement peu que le procédé soit trop sévère, et il paraît vraiment l'être; il sera toujours temps par une deuxiéme épreuve à la tuberculine de corriger cet excès de sévérité. Ce que nous demandons à ce procédé, c'est de ne pas laisser passer de tuberculoses sans les signaler: or, que voyons-nous? Le fait ne se passe que 2 fois sur 100. Comme nul procédé de diagnostic ne peut passer pour infaillible, nous avons le droit de considérer comme remarquable un tel résultat. D'autant plus qu'en fin de compte, comme nous l'avons déjà signalé dans toutes ces expériences, ce n'est pas l'autopsie qui fut le critérium, mais la réaction thermique: réaction parfaite, il est vrai, mais comme toute autre susceptible d'erreur. Nous en trouvons un cas dans les expériences de nos collègues; il y en aurait eu d'autres, peut-être, si toutes les autopsies avaient pu être pratiquées. On peut se demander, si avec le contrôle de l'autopsie, le chiffre de ces cas où l'oculo-réaction se serait trompée, n'aurait pas été singulièrement diminué.

Quels services la médecine vétérinaire peut-elle espérer retirer de ce procédé? Le premier, très appréciable à coup sûr est de diminuer le nombre des prises de température qui sont pour le vétérinaire une véritable cause d'ennuis et d'erreurs répétés. L'oculo-réaction seconde permet en outre la surveillance par le praticien du personnel qu'il a chargé des constatations thermiques. Pour le vétérinaire sanitaire, cela peut-être un avantage inappréciable. Parmi les animaux qu'on lui signale comme sans réaction thermale en aperçoit-il un dont les yeux sont rouges, injectés, couverts de muco-pus, qu'il fasse reprendre la température devant lui.

Enfin après M. Vallée, nos collègues ne manquent pas de signaler le grand avantage que l'on peut retirer du procédé en police sanitaire pour lutter contre les tentatives frauduleuses des propriétaires, ne craignant pas d'injecter avant la visite à l'abattoir ou à la frontière leurs animaux tuberculeux pour empêcher toute réaction thermale à la suite d'une nouvelle injection; mais en cas de tuberculose, cette précaution malhonnête n'empêchera pas l'apparition de la réaction oculaire.

Pratiquement, il faut donc comprendre le procédé de la façon suivante: il ne supprime pas la sous-cuti tuberculination, puisque cette injection sous-cutanée est nécessaire à la réaction: c'est un moyen de contrôle au cas où la réaction thermale est signalée comme negative; il faut dans ce cas ordonner une nouvelle tuberculination un mois après. De plus le vetérinaire trouve la tuberculination simplifiée puisque le nombre des prises de température est diminué; la première notamment, la plus ennuyeuse peut ainsi être, nous dit M. Morel, supprimée sans inconvénient.

Entrons maintenant plus avant dans la pratique de l'opération. M. Morel donne les conseils suivants qui nous paraissent parfaitement faciles à suivre "Lors de votre première visite sanitaire, dans une étable contaminée,

après avoir noté l'état des yeux, tout en prenant le signalement des animaux, instillez dans l'oeil, (l'autre reservé comme témoin), à l'aide d'un compte-gouttes et en faisant saillir le corps clignotant, 2 gouttes de tuberculine, soit médicale, soit brute, diluée à $\frac{1}{20}^{e}$ ou $\frac{1}{30}^{e}$; trois, quatre, cinq jours après, revenez faire votre injection sous-cutanée (comme pour une tuberculination ordinaire) et notez l'état des yeux. Le lendemain vers 7 à 8 heures du matin, vous viendrez relever la 1ere température ou la 2eme (la première pouvant dans ce cas être prise sans danger par le nourisseur). Vous observerez déjà que plusieurs animaux ont l'oeil rouge, pleurent ou même ont déjà un petit exsudat muco-purulent, à l'angle interne de l'oeil. A la 13eme heure, le nombre des réactions oculaires pourra être augmenté, s'il y à plusieurs cas de tuberculose et la réaction oculaire sera encore plus apparente chez les vaches ayant déjà réagi. Ce sont les animaux à réaction oculaire seconde qui auront de la température et non les autres. Peut-être vous arrivera-t-il de rencontrer une vache qui aura de l'élévation thermique sans réaction organique, mais en tout cas, je crois qu'il est bien rare qu'une vache à réaction oculaire positive et bien accentuée (à secrétion muco-purulente) soit indemne de tuberculose."

A ces conseils pratiques il n'y a rien à ajouter; on ne saurait trop insister sur la nécessité de ne tenir que des réactions franches. L'oculo-réaction simple a pu déterminer des conjonctivites banales, par irritation mécanique dont je parlais dans la première partie de ce rapport; ce sont des réactions banales disparaissant après quelques jours, que l'on ne voit pas reparaître après la tuberculination. C'est à notre avis tout le secret des "réactions disparition," que signale en passant notre collègue, M. Morel.

Chez l'homme, cette réaction combinée peut-elle avoir le même intérêt? Non certes: d'abord la simple ophtalmo-réaction est plus facile, plus sûre dans ses résultats qu'en médecine vétérinaire. De plus cette réaction combinée n'aurait aucun avantage sur la simple tuberculination que bien des médecins hésitent encore à employer, dans la crainte d'une réaction générale trop violente.

Il est permis cependant de se demander s'il ne serait pas possible en injectant sous la peau de l'homme une quantité de tuberculine infinitésimale, trop faible pour provoquer une réaction même légère, de rendre l'oeil sensible à l'ophtalmo-réaction. Si ce procédé donnait quelques résultats, la méthode de l'oculo-réaction seconde pourrait, en médecine humaine être utilement employée.

Il ne nous appartient pas de fournir une explication de cette réaction seconde, de cette sensibilisation de l'oeil éprouvé, à la suite de la tuberculination. Le phénomène lui-même de l'ophtalmo-réaction est encore mal élucidé dans sa pathogénie: il appartient à d'autres qu'à nous d'aborder le côté théorique de la question.

Conclusions.

L'étude de la question et des travaux que nos collègues nous ont soumis nous amène aux conclusions suivantes:

1°.—L'ophtalmo-réaction est un procédé de diagnostic qui est généralement sans danger, s'il n'est appliqué que sur des yeux indemnes de toute lésion tuberculeuse. Elle est quelquefois suivie d'accidents bénins et passagers;

2°.—La réaction n'est pas toujours proportionnée à la gravité des lésions. Souvent même elle manque dans les dernières périodes de la tuberculose;

3°.—Elle est quelquefois suivie d'une réaction générale, toujours légère et passagère;

4°.—Très souvent la réaction est douteuse. Chez les bovidés, à cause des difficultés d'examen, les cas douteux doivent être considérés comme négatifs. Chez l'homme, le nombre de ces cas douteux peut-être très réduit si l'on prend la précaution de comparer avec l'oeil congénère, éprouvé au moyen d'une solution dénuée de tuberculine et de noter exactement le moment du début de la réaction;

5°.—Chez l'homme, l'ophtalmo-réaction simple, sans être infaillible paraît appelée à rendre de réels services, en décelant l'existence de lésions jusque là inaperçues;

6°.—Chez les bovidés, l'ophtalmo-réaction simple, procédé très infidèle, ne peut prétendre remplacer la méthode de tuberculination. L'ophtalmo-réaction seconde donne des résultats bien supérieurs;

7°.—Dans l'immense majorité des cas les deux procédés, sous cuti-tuberculination simple et ophtalmo-réaction combinée donnent les mêmes résultats;

8°.—Il est exceptionnel qu'un animal tuberculeux ne réagisse pas à cette oculo-réaction seconde. Il est plus fréquent de voir une réaction oculaire positive chez un animal non tuberculeux;

9°.—L'ophtalmo-réaction combinée incapable de détrôner comme procédé de diagnostic la sous cuti-tuberculination, reste un moyen commode, infiniment plus simple, capable de rendre dans certains cas de réels services.

Bericht dargeboten im Namen der Société de Pathologie Comparée. (Commission über Ophthalmo-Reaktion.)—(Bailliart.)

Das Studium der Frage und der Untersuchungen, die von unseren Collegen dargeboten werden, bringt uns die folgenden Schlüsse:

1. Die Ophthalmo-Reaktion ist eine diagnostische Methode, die gefahr-

los ist, wenn dieselbe nur an Augen angewandt wird, welche von tuberkulösen Affektionen ganz frei sind. Manchmal folgen ihr milde und vorübergehende Unfälle.

2. Die Reaktion ist nicht immer der Schwere der Affektionen proportioniert. Ganz häufig fehlt sie sogar während der letzten Stadien der Tuberkulose.

3. Gelegentlich folgt ihr eine allgemeine Reaktion, die immer gering und vorübergehend ist.

4. Sehr häufig ist die Reaktion zweifelhaft. Beim Rinde müssen zweifelhafte Fälle wegen der Schwierigkeiten der Prüfung als negativ betrachtet werden. Beim Menschen kann die Zahl dieser zweifelhaften Fälle beträchtlich reduziert werden, wenn man Acht nimmt, das behandelte Auge mit dem anderen Auge, das mit einer Lösung frei von Tuberkulin behandelt worden ist, vergleicht, und genau den Augenblick betrachtet, in welchem die Reaktion eintritt.

5. Bei Menschen scheint eine einfache (primäre) Ophthalmo-Reaktion—obschon nicht unfehlbar—dazu bestimmt zu sein, einen wirklichen Dienst zu erweisen, da sie die Existenz von verborgenen Affektionen enthüllt.

6. Beim Rinde ist eine einfache (primäre) Ophthalmo-Reaktion ein sehr unsicheres Vorgehen und kann nicht die Einimpfung mit Tuberkulin ersetzen. Eine secundäre Ophthalmo-Reaktion giebt viel mehr sichere Resultate.

7. In der grossen Mehrheit der Fälle geben die beiden Methoden, einfache subkutane Einspritzung von Tuberkulin und die kombinierte Ophthalmo-Reaktion, dieselben Resultate.

8. Nur ausnahmsweise vermisst man in einem tuberkulösen Tiere diese zweite Ophthalmo-Reaktion. Häufiger sieht man eine positive Augenreaktion in einem nicht-tuberkulösen Tiere.

9. Obschon kombinierte Ophthalmo-Reaktion die subkutane Tuberkulineinspritzung als diagnostische Methode nicht stürzen kann, ist sie doch ein bequemes und unendlich einfacheres Vorgehen, das in gewissen Fällen thatsächlich gute Dienste erweisen kann.

Report Presented in the Name of the Société de Pathologie Comparée. (Commission on the Ophthalmo-reaction)—(BAILLIART.)

A study of the question and of the investigations submitted to us by our colleagues brings us to the following conclusions:

1. The ophthalmo-reaction is a diagnostic procedure which is usually without danger if it is applied only to eyes free from tuberculous lesions of any kind. It is sometimes followed by mild and transitory accidents.

2. The reaction is not always proportionate to the gravity of the lesions. Quite often it is even absent during the last stages of tuberculosis.

3. It is occasionally followed by a general reaction, which is always slight and transitory.

4. Very often the reaction is doubtful. In cattle, owing to the difficulties of examination, doubtful cases must be regarded as negative. In man, the number of these doubtful cases may be very much reduced by taking the precaution to compare the treated eye with its fellow, tested with a solution free from tuberculin, and accurately noting the moment when the reaction begins.

5. In man, a simple (primary) ophthalmo-reaction, although not infallible, appears to be destined to render a real service by revealing the existence of hidden lesions.

6. In cattle, a simple (primary) ophthalmo-reaction is a very unreliable procedure, and cannot take the place of inoculation with tuberculin. A secondary ophthalmo-reaction gives very much more trustworthy results.

7. In the vast majority of cases the two procedures, simple subcutaneous injection of tuberculin and the combined ophthalmo-reaction, give the same results.

8. A tuberculous animal only exceptionally fails to react to this second ophthalmo-reaction. It is more frequent to see a positive ocular reaction in a non-tuberculous animal.

9. Combined ophthalmo-reaction, while incapable of displacing subcutaneous injection of tuberculin as a diagnostic procedure, is nevertheless a convenient and infinitely more simple measure, capable of rendering real services in certain cases.

Comunicación presentada en nombre de la Société de Patologie Comparée. (Comisión Sobre la Reacción Oftálmica.)—(BAILLIART.)

Un estudio sobre las investigaciones sometidas á nosotros por nuestros colegas, forman la base de las concluciones siguientes:

1. La reacción oftálmica en el procedimiento del diagnóstico es por lo general sin peligro, cuando ésta se hace en los ojos libres de lesiones tuberculosas. Esta es algunas veces seguida de accidentes ligeros y transitorios.

2. La reacción no está siempre en proporción con la gravedad de las lesiones. A menudo ésta no se manifiesta durante el último período de la tuberculosis.

3. Es algunas veces acompañada de una reacción general la cual es siempre ligera y transitoria.

4. Muchas veces la reacción es dudosa. En el ganado, debido a la dificultad del examen, casos dudosos deberán conciderarse como negativos. En el hombre, el número de estas reacciones dudosas puede disminuirse si se toman las precauciones necesarias, esto es, comparando la reacción con el ojo opuesto en el cual se ha instilado otra solución que la de la tuberculina, y observar cuidadosamente el momento en el cual la reacción empieza.

5. En el hombre, una simple (primaria) reacción oftálmica, aunque no infalible, parece prestar un sevicio real revelando la existencia de lesiones ocultas.

6. En el ganado, una simple (primaria) reacción oftálmica es un procedimiento inseguro y ésta no puede reemplazar la inoculación de la tuberculina. Una segunda reacción oftálmica da un resultado más satisfactorio.

7. En la mayor parte de los casos los dos procedimientos, la simple inyección subcutánea de la tuberculina y la reacción oftálmica combinadas dan los mismos resultados.

8. En casos excepcionales solamente deja de reacciónar un animal tuberculoso a la segunda aplicacion oftálmica. Es mas frecuente la ocurrencia de una reacción ocular positiva en animales no tuberculosos.

9. La reacción oftalmica combinada, aunque incapaz de reemplazas la inyección subcutanea de la tuberculina en el procedimiento del diagnostico, es sinembargo una medida conveniente y mas simple, capaz de prestar un servicio real en ciertos casos.

OPHTHALMO-TUBERCULIN TEST IN CATTLE.

By David S. White and Eugene McCampbell,
Ohio State University.

Early in the fall of 1907 an opportunity was offered us to make a number of experiments to determine the efficacy of a new method of administering tuberculin for the diagnosis of tuberculosis recommended in human practice, namely, the instillation of tuberculin into the conjunctival sacs of tuberculous individuals. Our experiments were first suggested by the results obtained by Calmette on the human subject earlier in the year. The principle employed by Calmette was that of v. Pirquet, who observed that a local reaction was often noted at the point of injection in individuals affected with an infectious disease when the toxin from the microörganism inducing the infection is injected into the body. Von Pirquet applied the phenomenon to tuberculous subjects, and found that when tuberculin is introduced into the dermis, a local reaction followed; in non-tuberculous individuals no reaction of moment occurred. Vallée was probably the first to apply the ophthalmo-tuberculin test to domestic animals, and demonstrated that it possessed some value as a diagnostic agent. Later Vallée employed the ophthalmo-tuberculin reaction in cattle. At about the same time Lignieres, in South America, and we in the United States, experimented with this way of applying tuberculin to diagnose tuberculosis in cattle. This paper is to present in as brief a manner as possible our experience with this method.

First Series of Experiments.

For our first experiments we selected ten head of reacting cattle, *i. e.*, cattle which had given typical reactions to the usual subcutaneous tuberculin test. Five of these animals, which were part of a show herd, are known as Class A. Of these, four were in prime beef condition; one, a full-blooded Jersey cow, was thin in flesh, rough-coated, and subject to paroxysms of coughing. The other five, known as Class B, were grade Jersey cows, poor in flesh, rough-coated, one of them affected with a bad diarrhea. In the feces of this animal tubercle bacilli were found. These animals came from a herd of thirty-four, twenty-seven of which had been condemned after reacting to the tuberculin test. As control, twenty head of cattle were used. These are designated as Class C. With the exception of one (2C), all had

been repeatedly tested with tuberculin by the usual method, the last time being six months before our experiments.

Technic.—The method first tried was the administration of tuberculin as prepared by Calmette. A 1 per cent. solution was made by dissolving the precipitate, obtained by treating tuberculin with absolute alcohol, in sterile water. The solution was sterilized by steam at 100° C. One-tenth to one-fifth of a cubic centimeter (0.1 to 0.2) of the above solution was placed in the conjunctival sac of each cow. No results followed the use of this preparation. The tuberculin which gave the best results was procured from the Bureau of Animal Industry, Department of Agriculture. It was used by us as furnished (full strength) in doses of 0.25 c.c., and instilled with a sterile eye-dropper into the conjunctival sac of each animal. The right eye was used, its condition being noted and carefully compared with the left at the time of the injection. The *modus operandi* of instillation consists in having an assistant grasp the muzzle and horn of the animal and so rotate the head that the eye to be instilled is brought into as nearly a horizontal position as possible. The lower lid is then elevated, and the tuberculin allowed to flow over the lower portion of the bulbar conjunctiva. After instillation gentle massaging of the eyeball through the lid promotes absorption. Too much manipulation, however, induces excessive lacrimation and consequent washing out of the reagent. It is also advisable not to feed hay while the reaction is developing, on account of the cattle rubbing off the exudate which may flow.

Reaction.—Our experiments show that the ophthalmo-tuberculin reaction varies greatly in different animals, and also, to a lesser extent, in one and the same animal. In one cow (3A), for instance, a very marked reaction would be preceded or succeeded by a greater or lesser reaction. In other words, the reaction in a given animal is not always uniform. The intensity of the reaction varied from a mere congestion of the conjunctiva, especially marked in the membrana nictitans, to a pronounced fibrinous conjunctivitis with profuse exudation. Such a reaction, taken from our notes, may be considered of typical intensity: "In the right eye, beginning from six to eight hours after instillation of the tuberculin (0.25 c.c.), the lids appear slightly swollen. Photophobia and lacrimosis are present. Within sixteen to eighteen hours there appears upon the conjunctiva a thin layer of whitish-gray membrane. This is particularly marked on the bulbar conjunctiva covering the sclera and on the membrana nictitans, which is highly reddened. Thin films of this membrane are constantly being washed down over the cornea, where they appear as movable opacities, passing downward to the lower lid. The eyelashes are agglutinated with grayish-yellow exudate. The episcleral vessels are dilated. From the inner canthus is a discharge of straw-colored exudate which dries to form crusts. The left eye is normal."

The above-described reaction was much more marked in the cattle of Class A than it is in Class B. This we at first thought to be due to the fact that these cattle (Class B) has been within a month injected with tuberculin subcutaneously. They were, furthermore, much emaciated and were suffering from a more advanced form of tuberculosis. In other words, a certain degree of inhibition was assumed to be due either to the previous tuberculining, or to the more extensive tuberculosis, or to both. Later experience, however, did not confirm this view to the fullest extent. In fact, experiments showed that the more advanced the tubercular process in the body, the more pronounced the ophthalmo-tuberculin reaction; when subcutaneous injections were made concomitant with eye instillations of tuberculin, the ophthalmo-reaction became intensified. Experiments made upon these two classes (A and B) showed, further, that the hypersusceptibility of the conjunctiva could be increased by spaced instillations of tuberculin when the intervals between the instillations of tuberculin were over two weeks. When shorter (one or two days), the reaction was not so pronounced, but became so again as soon as the intervals were lengthened. On necropsy all of the cattle of Class B were found to be tubercular.

Of the control (Class C), none gave any reaction to the ophthalmic test, save one animal, No. 2C. This cow was the only one of the twenty controls which had not been treated by the usual method previous to our experiments. On necropsy she was found tubercular. Two other cattle, however (Nos. 8C and 10C), of this group which did not react to the ophthalmic test, when later tested by the usual method gave typical (thermic) reactions. On necropsy each was found to be tubercular. It is very possible that these two animals did give slight reactions (+), which, occurring during our first experience with this method, may have been overlooked. In our recent experiments we have noted both antianaphylaxis or immunity and very slight reactions (+). The reaction usually entirely disappears in forty-eight hours.

To graphically present the different degrees of reaction depending upon its intensity, we have adopted, with some modification, the scheme suggested by Baldwin and Comby. It is as follows:

(N) Negative. No difference observed in eyes.
(D) Doubtful. Slight redness of conjunctiva.
+ Slight engorgement of palpebral conjunctiva with exudation.
++ Marked engorgement of the whole conjunctiva, photophobia, lacrimation, exudate.
+++ Very marked reaction.

Second Series of Experiments.

Besides the cattle of Class A and of Class B, a new group of tubercular animals were used in these experiments. This group is designated Class D.

In addition, another group of twenty-six non-reacting cattle (temperature test) were used as control. These are known as Class E. Classes D and E were last tested with tuberculin by the usual method in January, 1908.

As in the first series, we found the tuberculin of the Bureau of Animal Industry the most stable and reliable for our experiments in this second series. In most cases it was instilled full strength. In a few cases the tuberculin was concentrated to one-tenth volume. The ophthalmic application of this concentrated tuberculin induced a more severe reaction (+ + +) than when tuberculin of the usual strength was employed. In these experiments smaller quantities, 0.1 c.c., were used. This seemed to give better results, as it caused less lacrimation to wash out the tuberculin before absorption has taken place.

Result.—The ophthalmic reaction occurred in varying intensity in all of the cattle in Class D. Although all of these cattle reacted, the reaction varied from a slight engorgement of the palpebral conjunctiva, with some exudation (+), to a very marked reaction (+ + +) in the different animals. It was noted that the reaction increased in intensity with each instillation so long as the periods between them were no shorter than two weeks. This indicates a marked hypersensitiveness of the conjunctival cells to tuberculin (anaphylaxis). In one case (3D) when four successive instillations were made at three-day intervals, the ophthalmic reaction did not occur after the last two instillations. This would indicate a local immunity (antianaphylaxis). This animal showed on necropsy tuberculosis of the lungs and of the bronchial and mediastinal lymph-glands. One case of "allergie"—that is, acquired immunity associated with anaphylaxis—occurred in a non-reacting cow (4E). This animal, which failed to react to the usual tuberculin test eight weeks before, twice showed a typical ophthalmic reaction to tuberculin. When subsequently tested with tuberculin by the usual method, she again failed to react. This cow is in perfect physical condition. This seems to be a case of artificially induced local anaphylaxis. Similar cases are noted in the human subject by Rosenau and Anderson. It is not common in cattle; we were unable to record another case. In a certain percentage of tuberculous animals the subcutaneous administration of 2 c.c. of tuberculin, occurring at the same time tuberculin was instilled into the eyes, seemed to intensify the ophthalmic reaction. Our experiments further elicited the fact that in most instances the intensity of the ophthalmic reaction was in direct proportion to the extent of the tubercular lesion. This was very marked in some cases. No. 3A, for instance, always gave a marked reaction to the eye test. On necropsy advanced tuberculosis was present. This, of course, differs from the usual tuberculin test, which commonly gives the most pronounced thermic reaction in those cattle which show on necropsy the least tuberculosis. No exceptions to this rule were noted in our experiments.

Ophthalmo-tuberculin Test on Calves.

The dams (2A, 4A, 5A) of these calves had repeatedly reacted to the usual tuberculin test, and several times to the ophthalmo-tuberculin test. Necropsy showed the dams to be extensively tubercular. The ophthalmic test was tried on these calves to determine if any conjunctival hypersensitiveness has been acquired in utero. The instillation of tuberculin into the eye failed to elicit any reaction whatever. Two subsequent instillations likewise produced no effect. The calves were evidently not in a state of anaphylaxis to tuberculin. It has been noted in guinea-pigs that the sensitizing substance can be transmitted to the fetus in utero, and after the birth the offspring give a reaction. It is possible that the calves were antianaphylactic or immune to tuberculin and tuberculosis. Subsequent experiments will be made with these animals.

Ophthalmo-Tuberculin Test on Vaccinated Cattle.

Seven cattle were used in these experiments—six heifers and a young bull. These cattle had received intravenous injections of 1 c.c., 1.5 c.c., and 2 c.c., respectively, of an emulsion of human tubercle bacilli in physiological sodium chlorid solution. Guinea-pigs inoculated with the emulsion intraperitoneally died in four weeks of tuberculosis. A second series, from the first, died in five weeks. The cattle received three injections, six weeks apart. The method is that used by von Behring and modified by Pearson of this country. When the ophthalmic test was applied to these vaccinated cattle, it was noted that three gave on the first test a conclusive reaction which was not very pronounced (+), and four failed to react. On the second test, after an interval of six weeks, three reacting cattle showed an ophthalmic reaction of mild intensity. One heifer showed slightly more conjunctivitis than the others. Four animals failed to react. On the third test, six weeks later than the second, no reactions were observed on any of the cattle. When again tested in eight weeks, two of the three reacting cattle responded to the ophthalmic test. It would seem that at the time of the first test, as a result of vaccination, the three animals were in a state of anaphylaxis, and as a result of the instillation into the eye there was developed a state of antianaphylaxis or immunity. We are inclined to believe that this condition of partially acquired immunity as a result of the ophthalmic test is entirely local, for when these three cattle were subsequently tested with tuberculin by the usual subcutaneous method, they gave temperature reactions. When tested again in six weeks, two showed an atypical reaction and one failed to react. Four animals failed to react to the usual tuberculin test. Pearson explains this fact by stating that the animals subsequent to vaccination are in a condition of hypersus-

ceptibility to tuberculin (anaphylactic). This hypersusceptibility is present for varying lengths of time. It requires, therefore, several injections of tuberculin in these cases which are still hypersensitive to use up or combine with, so to speak, this hypersensitive substance (anaphylactin).

We are not prepared at this time to state whether all these vaccinated animals are tubercular or entirely immune to tuberculosis. Only a necropsy will reveal the truth.

Conclusions and Summary.

We are able to sum up our observations in this series of experiments as follows:

1. The ophthalmo-tuberculin test is of limited value in the diagnosis of tuberculosis in cattle. In some cases the reaction is very slight (hyperemia). In others pronounced congestion with profuse exudates are noted. Accuracy of observation is important. *We are inclined to rely primarily on the result of the first instillation of tuberculin.* Second instillations rarely elicit reactions in non-tubercular animals.

2. In the majority of animals tested the reaction increased in its intensity with each subsequent instillation of tuberculin. This fact indicates the development of a local hypersusceptibility of anaphylaxis associated with a partial immunity. Von Pirquet calls this condition "allergie."

3. It is possible in some cases to create a condition of "allergie" in healthy cattle, when spaced instillations of tuberculin are made. It is evident, therefore, that the result of the first instillation of tuberculin should be made the only basis of diagnosis. Rosenau and Anderson have called attention to this point in regard to the human subject.

4. When repeated instillations of tuberculin are made on the conjunctiva at short intervals (twenty-four hours, etc.), a local immunity (antianaphylaxis) results (3D, *et al.*). If the instillations are separated two weeks or more, anaphylaxis results.

5. We hold, therefore, that if tuberculin (0.1 c.c.) is carefully instilled into the conjunctival sac and the condition of the instilled eye carefully compared with the opposite eye, and a reaction of varying intensity results in from ten to twelve hours after the first instillation, a tubercular lesion is present.

6. While in our first experiments we were inclined to believe that a subcutaneous tuberculin injection given previous to the ophthalmic test would slightly inhibit it, we have since become convinced that this is true only to a limited extent. In some cases the ophthalmic reaction is exaggerated by a subcutaneous injection of tuberculin.

7. The primary ophthalmo-tuberculin reaction is in direct proportion to the extent of the tubercular process in the body. The more extensive

the tubercular lesion, the more anaphylactic the animal is. This is in direct variance with the condition in the usual subcutaneous tuberculin test.

8. We are inclined to believe that the ophthalmo-tuberculin test will reveal tuberculosis at as early a stage as the usual subcutaneous tuberculin test.

9. The ophthalmic reaction is of no value in determining whether vaccinated cattle are actively tubercular or not, or in demonstrating any hypersusceptibility in the offspring of tubercular cattle.*

Prueba de la Oftalmo-tuberculina en el ganado.—(WHITE Y MCCAMPBELL.)

Durante el otoño de 1907, hicimos un número de experimentos sobre tuberculosis en el ganado de prueba, instilando tuberculina en los sacos conjunctivos. La tuberculina que diá los más felices resultados fué obtenida del "Bureau of Animal Industry," Departamento de Agricultura de los Estados Unidos. Se usó en toda su fuerza tal cual se prepara en el "Bureau" para la aplicación subcutánea usual. Se usaron en el experimento setenta y un animales, incluyendo siete vacunados contra tuberculosis.

Como resultado de estos experimentos los investigadores llegaron á la siguiente conclusión:

1. La prueba de la oftalmo-tuberculina es de valor limitado para el diagnostico de la tuberculosis en el ganado. En algunos casos la reacción es muy débil (Hiperemia). En otros se nota congestión más pronunciada con abundante sudor. Es importante el esmero en la observación. Nos inclinamos á confiar en el resultado de la primera instilación de tuberculina. Las segundas instilaciones raramente traen reacción en animales no tuberculosos.

2. En la mayoría de los animales probados la reacción aumentó en intensidad con cada subsecuente instilación de tuberculina. Este hecho indica el desarrollo de una supersusceptibilidad local ó anafilaxia, asociada con uninmunidad parcia. Von Pirquet llama este estado "alergia."

3. En algunas casos es posible crear un estado de "alergia" en el ganado sano, cuando se hacen instilaciones de tuberculina á intérvalos. Es evidente, por tanto, que el resultado de la primera instilación de tuberculina debe ser la sola base para el diagnóstico. Rosenau y Anderson han llamado recientemente la atención sobre este punto con respecto al hombre.

4. Cuando se hacen repetidas instilaciones de tuberculina en la conjuntiva, á cortos intérvalos (veinte y cuatro horas, etc.) resulta una inmunidad local. Si las instilaciones se espacian dos semanas ó màs, resulta anafilaxia.

* For complete report see Journal of Experimental Medicine, March, 1908; Sept., 1908.

5. Por tanto nosotros creemos que si la tuberculina (1 c.c.) es cuidadosamente instilada en el saco conjuntivo, y el estado del ojo instilado se compara cuidadosamente con el ojo opuesto y si una reacción de intensidad variable resulta de diez á doce horas después de la primera instilación, existe una lesión tuberculosa.

6. En nuestros primeros experimentos estábamos inclinados á creer que las inyecciones subcutáneos, hechas antes de la prueba ocular, afectarían lijeramente; pero nos hemos convencido que esto es verdad sólo hasta cierto punto, y que en algunos casos la reacción oftálmica es exagerada por una inyección subcutánea de tuberculina.

7. La primitiva reacción oftálmico-tuberculina está en proporción directa con la extensión del proceso tuberculoso en el cuerpo. Mientras más extenso es el proceso, más anafilático es el animal. Esto está en directo desacuerdo con la condición en la prueba usual subcutánea.

8. Nos inclinamos á creer que la prueba de la oftalmo-tuberculina revelará la tuberculosis en estado prematuro como la prueba usual subcutánea.

9. La reacción oftálmica no tiene valor alguno para determinar si el ganado vacunado está tuberculoso ó no, ni para demostrar ninguna supersusceptibilidad en la prole del ganado tuberculoso.

L'Ophtalmo-Réaction chez le Bétail.—(WHITE ET MCCAMPBELL.)

Pendant l'automne de 1907, nous fîmes un certain nombre d'expériences sur le bétail avec des instillations de tuberculine dans les sacs conjonctivaux. La tuberculine qui produit les meilleurs résultats avait été fournie par le Bureau de l'Industrie Animale, du Département de l'Agriculture des Etats-Unis. On s'est servi pour les expériences de soixante-et-onze animaux.

Les investigations ont fourni les conclusions suivantes.

1. La réaction-ophtalmo-tuberculine est de valeur limitée dans le diagnostic de la tuberculose chez le bétail. Dans quelques cas la réaction est trés-légère (hypérémie). Dans d'autres on a noté une congestion plus prononcée avec des exsudats profus. Une observation trés-précise est importante. Nous sommes enclins à compter sur les résultats obtenus par une première instillation de tuberculine. Les deuxièmes instillations occasionnent rarement de réaction chez les animaux non tuberculeux.

2. Chez la plupart des animaux traités, la réaction s'est accrue dans son intensité avec chaque instillation de tuberculine. Ce fait indique le développement d'une hypersensibilité locale ou anaphylaxie associée à une immunité partielle. Von Pirquet donna à cette condition le nom "d'allergie."

3. Dans certains cas, il est possible de créer une condition "d'allergie" chez un animal sain, quand des instillations espacées de tuberculine sont pratiquées. Il est donc évident que les résultats de la première instillation devraient constituer la seule base du diagnostic. Rosenau and Anderson ont récemment appelé l'attention sur ce point à propos du sujet humain.

4. Quand des instillations répeteés sont faites sur la conjonctive à de courts intervalles (vingt-quatre heures, etc.) une immunité locale en résulte. Si les instillations sont espacées de deux semaines ou plus, l'anaphylaxie en résulte.

5. Nous constatons donc que, si la tuberculine (1 c.c.) est instillée avec soin, dans le sac conjonctival, et si la condition de l'œil instillé est soigneusement comparée à celle de l'œil opposé, une réaction d'une intensité variante, se manifestant dans l'espace de dix à douze heures après la première instillation, est preuve qu' une lésion tuberculeuse est présente.

6. Dans nos premières expériences nous étions enclins à croire que l'injection tuberculeuse sous-cutanée, donnée avant le traitement oculaire, l'arréterait un peu. Depuis nous avons été convaincus que cela est vrai seulement jusqu'à une certaine limite et que dans quelques cas l'ophtalmo-réaction est exagérée par une injection sous-cutanée de tuberculine.

7. Que la réaction primaire ophtalmo-tuberculine est en rapport direct avec l'étendue du processus tuberculeux dans le corps; plus ce dernier est étendu, et plus l'animal est anaphylactique. Ceci est en désacord avec les conditions dans la réaction sous-cutanée ordinaire.

8. Nous sommes enclins à croire que la réaction ophtalmo-tuberculine révélera la tuberculose dans un étage tout aussi précoce que le fait la réaction sous-cutanée ordinaire.

9. Que l'ophtalmo-réaction n'a aucune valeur pour déterminer si le bétail vacciné est atteint de tuberculose active ou non, ni pour démontrer s'il existe quelque hypersensibilité dans les petits de bétail tuberculeux.

Die Ophthalmo-Tuberkulin-Probe beim Rindvieh.—(White und McCampbell.)

Im Herbst 1907 wurde an Rindern eine Reihe von Versuchen angestellt, indem den Tieren Tuberkulin in den Conjunctivalsack eingetropft wurde. Das Tuberkulin, welches zu den besten Resultaten führte, kam aus dem Bureau of Animal Industry, U. S. Department of Agriculture.

Die Versuche lassen nachstehende Schlussfolgerungen zu:

1. Die Ophthalmo-Tuberkulin-Probe ist von begrenztem Werte in der Diagnose von Tuberkulose der Rinder. In manchen Fällen ist die Reaction eine sehr schwache (Hyperämie). In anderen zeigt sich ausgesprochenere

Congestion, die von profuser Exsudation begleitet ist. Genaue Beobachtung ist unerlässlich. Wir stützen uns stets auf die Ergebnisse der ersten Tuberkulin-Instillation. Weitere Applicationen erzeugen selten Reaction in nicht-tuberkulösen Tieren.

2. In der Mehrzahl der Versuchstiere nahm die Reaction mit jeder nachfolgenden Tuberkulin-Instillation an Intensität zu. Dies weist auf die Entwicklung einer localen Ueberempfindlichkeit oder Anaphylaxis hin, verbunden mit teilweiser Immunität. Von Pirquet nennt diesen Zustand "Allergie."

3. Es gelingt manchmal, in gesunden Rindern einen Zustand von "Allergie" zu erzeugen, wenn abgeteilte Instillationen vorgenommen werden. Hieraus ergibt sich die Notwendigkeit dessen, blos die erste Tuberkulin-Instillation für Diagnose zu benützen. Rosenau und Anderson haben dies vor kurzem auch mit Bezug auf Tuberkulose im Menschen hervorgehoben.

4. Werden Ophthalmo-Tuberkulin-Proben in kurzen Abständen (24 Stunden, u. s. w.) applicirt, so entsteht lokale Immunität. Werden die Instillationen in zweiwöchentlichen oder längeren Abständen ausgeführt, ergibt sich Anaphylaxis.

5. Wir folgern hieraus, dass wenn Tuberkulin (1 ccm.) sorgfältig in den Conjunctivalsack geträufelt wird, der Zustand des instillirten Auges genau mit dem anderen verglichen wird, und in 10–12 Stunden nach der ersten Application eine mehr oder minder starke Reaction auftritt, ein tuberkulöses Leiden vorhanden sei.

6. Gelegentlich unserer ersten Versuche lehnten wir der Ansicht zu, dass subkutane Tuberkulin-Injectionen, vor der Ophthalmo-Tuberkulin-Probe angewandt, diese etwas verwischen. In der Folge kamen wir jedoch zur Ueberzeugung, dass dies nur bis zu einem gewissen Grade zutreffe, und dass in manchen Fällen die Ophthalmo-Reaction durch subkutane Tuberkulin-Injectionen accentuirt werde.

7. Die primäre Ophthalmo-Tuberkulin Reaction steht in directem Verhältnisse zur Ausdehnung des tuberkulösen Prozesses im Körper. Je ausgebreiteter der tuberkulöse Vorgang, um so anaphylaktischer zeigt sich das Tier. Dies steht in directem Gegensatze zu den Verhältnissen bei subkutanen Injections-Proben.

8. Wir neigen der Ansicht zu, dass die Ophthalmo-Tuberkulin-Probe die Tuberkulose in ebenso frühzeitigem Stadium ausweist, wie die übliche subkutane Injections-Methode.

9. Die Ophthalmo-Reaction hat keinen Wert, wo die Frage zu entscheiden ist, ob ein geimpftes Tier an activer Tuberkulose leide oder nicht; oder wo in Sprösslingen tuberkulöser Rinder eine Ueberempfindlichkeit zu eruiren wäre.

SUR UN NOUVEAU MODE DE PRODUIRE CHEZ L'HOMME TUBERCULEUX LA RÉACTION DE LA PEAU A L'AIDE DE LA TUBERCULINE.

PAR M. LE PROFESSEUR T. LIGNIERES,
Directeur de l'Institut de Bacteriologie du Ministère de l'agriculture, Buenos Aires.

Grâce á la très importante découverte de von Pirquet nous savons que, en mettant un peu de tuberculine sur des scarifications récentes et superficielles de la peau, on produit, chez les tuberculeux, une réaction plus ou moins intense au niveau de ces scarifications, tandis que la cicatrisation se fait d'une manière absolument normale quand il s'agit d'organismes libres de bacilles de Koch; c'est la cuti-réaction de von Pirquet ou cuti-tuberculinisation.

Peu après, Wolff-Eisner et Calmette démontrèrent qu'il existe aussi une réaction locale spécifique quand on fait agir la tuberculine sur la conjonctive.

C'est *l'ophtalmo-réaction* de Wolff-Eisner, Calmette, ou oculo-tuberculinisation.

Dans une note du 18 Septembre 1907, j'ai fait connaitre que la peau des tuberculeux récemment rasée, sans aucune scarification, et simplement frottée avec quelques gouttes de tuberculine brute, donne une réaction spécifique des plus caractéristiques.

J'ai proposé de réserver la dénomination de dermo-réaction à l'opération de von Pirquet parcequ'elle interesse directement le derme, et de donner celle de cuti-reaction ou cuti-tuberculinisation à celle que j'ai indiquée.*

La dermo et la cuti-reaction ne provoquent aucune perturbation thermique ou générale chez les malades; elles peuvent se répéter avec succès presque sans limites, à de très courts intervalles.

Rien n'est plus facile que d'amalgamer la dermo et la cuti-réaction; il suffit de frotter la peau avec la tuberculine sur toute la superficie au lieu de deposer simplement un peu de tuberculine sur les incisions superficielles; c'est là un excellent procède.

Chez les bovins tuberculeux, les frictions de tuberculine sur la peau bien rasée déterminent après 24 ou 48 heures, une réaction inflammatoire

* Depuis, j'ai reconnu que ce changement pouvait produire une confusion, de sorte que je conserve la dénomination de cuti-réaction pour l'opération de von Pirquet et de dermo-réaction pour celle que j'ai indiquée.

spécifique d'une intensité variable: depuis la simple rougeur jusqu'à la tuméfaction œdémateuse avec ou sans eruption vésiculeuse qui se termine par la formation de croûtes.

Sur le lapin, et surtout le cobaye tuberculeuse, la réaction de la peau se produit facilement dans les mêmes conditions, mais surtout sous la forme œdémateuse; on peut ainsi-faire parfois le diagnostic précoce sans nécessité de scarifier les animaux d'expériences.

Chez l'homme, ma dermo-réaction peut rendre aussi d'excellents services; je me propose de m'y arrêter quelque peu dans la présente note.

Technique de la dermo-réaction.—A la face interne du bras, au niveau des biceps, on applique le savon avec un blaireau ordinaire sur une superficée de vingt centimètres carrés environ; ensuite, avec un safety rasoir mécanique, on rase la peau délicatement et en tous sens.

Après avoir enlevé avec de l'eau propre l'exces du savon, puis sèché la surface rasée à l'aide dune serviette ou mieux d'un tampon de coton, il ne reste plus qu'à y déposer 5 à 6 grosses gouttes de tuberculine brute, c'est à dire non diluée, avec lesquelles on frictionne la région (l'emploi de préférence une *tuberculine brute* plus concentrée que celle qu'on trouve d'ordinaire dans le commerce).

Pour faciliter l'absorption, on doit tendre la peau avec la main gauche, tandis que la droite pratique le friction à l'aide *d'un doigt de caoutchouc ou d'un petit tampon de coton* maintenu à *l'extrémité d'une pince.*

Il suffit de frictionner une *ou deux minutes*; on laisse ensuite sécher, l'opération est terminée sans que le patient ait souffert la moindre douleur.

On peut aussi faciliter l'absorption de la tuberculine en frictionnant préalablement la surface rasée avec l'alcool ou le Xylol. La peau rougit et lorsqu'elle est bien sèche, on applique la tuberculine pour faire la friction.

Résultats de l'opération.—Chez les individus tuberculeux, il y a une réaction spécifique que se manifeste à des degrés et sous des formes variables.

Elle est essentiellement éruptive et apparaît, en général, dès la vingt-quatrième heure. Quelquefois elle ne se présente qu'après 48 heurs, et dans des cas exceptionnels plus tard encore.

A la superficée de la peau rasée et frictionnée apparaissent des papules plus ou moins nombreuses, d'une teinte qui varie du rose trés pâle mêlé de jaune ou de gris, jusqu'à rouge foncé et même jusqu'à violacé. A la base de ces papules, on peut noter une auréole de la même teinte.

Les papules sont dans quelques cas si nombreuses qu'elles arrivent à se confondre pour former des ilots confluents plus ou moins étendus, ou même une véritable plaque œdémateuse et rouge d'aspect eczémateux. L'éruption peut s'arrêter au stade de simple papule qui disparait après 4 ou 5 jours sans presque laisser de trace sinon au toucher.

Si la réaction est plus intense, l'éruption arrive jusqu'au stade de vesicule et parfois de vesico-pustule avec formation de vraies croûtes.

Les petites vesicules à centre blanc jaunâtre, s'observent durant plusieurs jours, puis, se fanent peu a peu pour disparaître en un temps variable, jamais moindre d'une semaine.

Après leur disparition, elles laissent une pigmentation rouge ou brunâtre de la peau qui persiste des semaines.

Cette pigmentation est en rapport avec l'intensité de l'éruption.

En même temps que cette pigmentation, on voit souvent se former des pellicules épidermiques blanches à la surface et autour des papules; ces pellicules qui parfois prennent l'aspect de croûtes squameuses peuvent affecter la forme de petites couronnes épidermiques. Durant l'évolution de l'éruption, le sujet présente comme pour la vaccination jennérienne, une sensation de démangeaison en général peu intense. Jamais, ainsi que je l'ai dit au début, on n'observe ni fièvre ni phénomènes généraux.

Differents degrés de réaction.—Pour la facilité des descriptions, je reconnais trois degrés a la dermo-réaction.

1. Dans le premier, les papules isolées ne dépassent pas le nombre de dix.

2. Dans le second degré, il y a plus de dix papules et quelques unes peuvent être confluentes.

3. Enfin le troisième degré est caractérisé par la confluence des papules confluentes formant une plaque surtout au partie de la superficie frotteé avec la tuberculine.

En dehors de ces trois degrés il faut tenir en compte l'intensité de l'éruption. En effet, on observe que dans chacun de ces trois degrés la réaction inflammatoire de la peau peut être faible, moyenne ou violente.

Il sera intéressant d'étudier si ces differentes modalités de l'éruption ont une signification surtout au point de vue du pronostic.

En général, et notamment chez les adultes, la cuti-réaction a, dès les premières vingt-quatre heures, le degré et l'intensité que vont la caractériser. Il y a cependant beaucoup d'exceptions a cette règle. On observe, en effet particulièrement chez les jeunes enfants, des dermo-réactions qui, au début, sont du premier degré et qui passent après plusieurs jours au second degré et même jusqu'au troisième. Chez les jeunes sujets, on constate quelquefois aussi deux ou plusieurs poussées éruptives successives de manière qu'on peut rencontrer à la fois sur la même dermo-réaction, une pigmentation de la peau laissée par d'anciennes papules plus au moins disparues, couvertes ou non de pellicules epidermiques, avec des papules et des vésico-pustules récentes.

Ces dermo-réactions par poussées durent plus longtemps que celles dont l'éruption se fait en un seul temps.

Grace á l'obligeance de M. le docteur José Perma, directeur de l'assistance Publique de Buenos Airês, et de M. le Docteur Maximo Castro, médecin de l'hôpital des Enfants, j'ai pu, avec la collaboration de mes amis les docteurs

Leopoldo Uriarte et Mariano R. Castex, appliquer la dermo-réaction à un nombre assez élévé de sujets des deux sexes et de tous âges atteints de formes varieés de tuberculose ou indemnes de bacilles de Koch. Les résultats seront consignés dans des publications ultérieures.

Sensibilité comparée de l'ophtalmo, de la dermo et cuti-réaction chez l'homme.—Si on répète l'opération plusieurs fois chez les cachectiques, on peut parfois provoquer une réaction positive alors que la première n'avait pas donné de resultat.

En résumé, l'ophtalmo-réaction reste le procedé de diagnostic le plus sensible. La dermo et la cuti-réaction peuvent être tenues comme également constantes sauf dans les cas de cachexie tuberculeuse où le diagnostic clinique est heureusement assez facile à faire.

J'attache plus d'importance à la réaction positive de la dermo-réaction plutot qu'à celle de la réaction oculaire. Pour moi, il ne peut y avoir aucun doute dans le diagnostic tuberculeux si la dermo-réaction est positive, tandis qu'il y a des cas assez fréquents de réactions oculaires douteuses dans lesquelles il est difficile de se prononcer catégoriquement.

Dans la pratique courante et comme je vais l'expliquer un peu plus loin, la dermo-réaction me parait être le mode de diagnostic qui doit être tout d'abord employé.

Si le cas est négatif on compléte le diagnostic par l'ophtalmo-réaction.

Quelques avantages de la dermo-réaction.—La dermo-réaction est non seulement d'une application extremement facile, mais encore nullement douloureuse, de sorte que tous les malades l'acceptent facilement quels que soient leur catégorie sociale, leur sexe, leur âge. Il n'y a pas le plus petit danger d'infection spontanée puisque la peau n'est pas ouverte. Quand la réaction est positive, même si les papules sont rares, elle est tellement caractéristique qu'il ne peut y avoir aucun doute pour les débutants.

La réaction positive cutanée a une valeur absolue. Dans la pratique de la clientèle, il me parait y avoir quelques avantages a faire le diagnostic précoce de la tuberculose en employant tout d'abord la dermo-réaction.

Si celle est positive, le diagnostic est certain. Si elle est négatif, il y a présomption que le sujet n'est pas tuberculeux; on doit alors et comme contrôle pratiquer l'ophtalmo.

En agissant ainsi, on erite aux malades des réactions oculaires parfois un peu trop fortes et inutiles.

La dermo-réaction est particulièrement exact et notable chez les enfants. Je n'ai jamais rencontré le plus léger inconvenient a l'employer, tandis qu'ils acceptent plus difficilement la cuti-réaction de lecture parfois douteuse. Quant à l'ophtalmo-réaction chez les jeunes sujets, elle peut produire ou reveiller dans quelques cas, rares il est vrai, des lésions oculaires durables et désagréables.

A New Method of Producing in a Tuberculous Human Being the Cutaneous Tuberculin Reaction.—(LIGNIERES.)

I. The cuti-reaction of von Pirquet, and the ophthalmo-reaction of Wolff-Eisner and Calmette. The technic and significance of the two reactions.

II. The author's method: If a few drops of crude tuberculin are rubbed into the skin of a tuberculous patient, freshly shaved, without any scarification, a most characteristic reaction is produced. The author proposes to call von Pirquet's test, cuti-reaction, and his own modification dermo-reaction. Neither of these reactions produce the slightest thermic or general disturbance; they may be repeated successfully to an almost unlimited extent, at very short intervals. The two reactions may be combined by rubbing the tuberculin on the entire surface, instead of merely placing a small quantity on the superficial incisions. In cattle, tuberculin rubbed into the skin after shaving, produces in twenty-four hours to forty-eight hours a specific inflammatory reaction of variable intensity, from simple redness to edematous tumefaction, with or without vesicular eruption, terminating in the formation of crusts. The reaction is easily produced under the same conditions in the tuberculous rabbit and guinea-pig, but it usually takes the edematous form.

The possibility of early diagnosis without scarifying the experimental animals: In man the author's dermo-reaction is also capable of doing excellent service.

Technic of the Dermo-reaction.—The skin on the inner surface of the arm at the level of the biceps is lathered with an ordinary shaving brush, over a surface of about 20 square cm., and then shaved with a safety razor in every direction.

Advantages of the safety razor:

After removing the excess of soap with clean water, and drying the shaved surface with a cotton pledget, from five to six large drops of crude tuberculin (not diluted) are rubbed on the prepared surface. To hasten absorption, the skin is put on the stretch with the left hand, and rubbed with a finger on the right hand protected with a rubber finger-cot, or a small cotton tampon held in a pair of forceps. Absorption of the tuberculin may be hastened by previously rubbing the surface with alcohol and xylol. This causes redness of the skin, and as soon as this dries, the tuberculin is applied with friction.

Results of the Procedure.—In normal individuals the skin remains entirely normal. In tuberculous individuals there is a specific reaction manifesting itself chiefly in an eruption, and apparent, as a rule, in twenty-four hours, sometimes delayed for forty-eight hours, and in exceptional

cases still longer. The treated surface is covered with papules ranging in color from a very pale pink mixed with yellow or gray to dark red or even purple. The base of each papule is surrounded by an areola of the same color. Sometimes the papules are very numerous and coalesce to form confluent little islands, or even a large red patch of an edematous appearance. The eruption may stop at the stage of a simple papule, which disappears in four or five days practically without leaving a trace, except to the sense of touch. When the reaction is more intense, the eruption goes on to the vesicular and occasionally to the vesicopustular stage, with the formation of true crusts. The latter is rare in man. The small vesicles with yellowish-white centers persist for several days, then gradually fade, and by the end of a week disappear entirely, in almost every instance. Their disappearance leaves a small red or brownish spot which persists for weeks. This pigmentation is proportionate to the intensity of the eruption. The pigmentation is often accompanied by the formation of white epidermic pellicles or scales on the surface and around the papules; these scales sometimes assume the form of small epidermal crowns. Some itching attends the development of the eruption, as in the case of a vaccination; but fever and constitutional symptoms never develop.

Different Degrees of the Reaction.—(1) Isolated papules not exceeding ten in number. (2) More than two papules, some of them confluent. (3) Confluent papules forming a patch on all or part of the treated surface. The intensity of the eruption must also be taken into account, the inflammatory action of the skin being variable in each of the three degrees of the reaction.

Significance.—In general, and especially in adults, the cuti-reaction develops its characteristic degree of intensity during the first twenty-four hours. There are many exceptions to this rule. In young children especially the dermo-reaction may in the beginning be of the first degree, and in the course of several days go on to the second or even the third degree. Successive crops are sometimes observed in young subjects, so that various stages of the reaction may be present at the same time. When the eruption appears in crops, the duration is longer than when the papules all come out at once. Observations on a number of patients, both normal and tuberculous, form the subject of a later paper.

Comparative Sensitiveness of the Ophthalmo-, Dermo-, and Cuti-reaction in Man.—The ophthalmo-reaction is the most sensitive of all the diagnostic procedures. The dermo-reaction and cuti-reaction are equally constant, except in cachectic cases, in which the clinical diagnosis is fortunately quite easy. (In the latter class the cuti-reaction sometimes proves positive after several attempts, giving it a slight advantage over

the dermo-reaction in this class of cases.) A positive dermo-reaction is more significant than a positive oculo-reaction. It always indicates the presence of tuberculosis. In ordinary practice the dermo-reaction should be employed first, and if it proves negative, the diagnosis may be completed by means of the ophthalmo-reaction.

Advantages of the Dermo-reaction.—Ease of application; painlessness; absence of danger of spontaneous infection, since the skin is not broken. The reaction when positive is absolutely characteristic, and therefore easily interpreted by beginners. A positive cutaneous reaction is of absolute value. In private practice the dermo-reaction should be employed first. If it is positive, the diagnosis is asserted; if it is negative, it is presumptive evidence against tuberculosis, and the diagnosis should be controlled by means of the ophthalmo-reaction. The dermo-reaction is particularly accurate in children. I have never seen the slightest ill effect from its use; while the cuti-reaction is occasionally not well tolerated, and is besides difficult to interpret. As for the ophthalmo-reaction in young subjects, it may produce or revive, in a few rare cases, it is true, permanent and very unpleasant ocular lesions.

SUR L'INTRA-DERMO-RÉACTION A LA TUBERCULINE CHEZ LES ANIMAUX.

PAR LE PROF. G. MOUSSU,
de l'école vétérinaire d'Alfort,

ET LE DR. CH. MANTOUX,
Ancien interne des hôpitaux de Paris, Médecin consultant à Cannes (Le Cannet).

Sous le nom *d'intra-dermo-réaction à* la tuberculine, l'un de nous* a désigné ainsi l'épreuve résultant de l'injection d'une quantité dosée de tuberculine dans l'épaisseur même de la peau.

Chez l'espèce humaine à la dose de un centième de milligramme, les résultats de cette injection ont été absolument démonstratifs pour la révélation des cas de tuberculose latente, de tuberculose douteuse ou de tuberculose avérée; car, dans les quelques rares cas où l'épreuve est restée sans effets, il s'agissait de sujets en état de cachexie ou de consomption.

Il devenait dès lors intéressant de transporter cette épreuve dans le domaine des animaux, pour voir si expérimentalement les effets seraient comparables, et si pratiquement il y avait quelque bénéfice à en retirer pour les cas de tuberculose latente chez les différentes espèces.

Dans ce but, nous nous sommes attachés à déterminer d'abord les effets de l'épreuve chez des animaux de l'espèce bovine déjà reconnus antérieurement sûrement tuberculeux et chez des sujets reconnus aussi sûrement sains.

Lorsque dans ces conditions on injecte dans l'épaisseur du derme† de $\frac{1}{10}^{e}$ à $\frac{1}{5}^{e}$ de centimètre cube de tuberculine brute diluée à $\frac{1}{10}^{e}$ dans l'eau physiologique ou l'eau distillée, c'est-à-dire de 1 à 2 centigrammes de tuberculine suivant la taille et le poids des sujets, on constate:

1° Que, chez tous les animaux sains sans exception, l'épreuve reste sans effets immédiats et sans résultats éloignés. A peine reste-t-il trace de la piqûre après quarante-huit heures;

* Ch. Mantoux: "Intra-dermo-réaction à la tuberculine" (Comptes rendus de l'Acad. des sciences, 10 août 1908).

† Pour cette injection intra-dermique une seringue de Pravaz de 1 centimètre cube, graduée et munie d'un curseur, suffit; chaque seringue remplie de tuberculine diluée contient 10 doses, ou 5 doses, suivant la taille et le poids des sujets. Une aiguille courte, assez fine, permet aisément de pénétrer directement dans l'épaisseur du derme, si elle est introduite très superficiellement, à fleur de peau. Si par exception elle pénètre dans le tissu conjonctif sous-cutané, sans la retirer, le derme peut être abordé et piqué par sa face profonde.

2° Que chez tous les animaux tuberculeux, au contraire, il se produit à partir du moment de l'injection une réaction locale très vive qui se traduit par de l'augmentation de sensibilité de la peau, *de l'épaississement du derme et l'apparition, durant les quarante-huit heures qui suivent l'injection, d'une plaque circulaire d'œdème sous-cutané dont les dimensions peuvent varier de celles d'une pièce de 5 francs à celles de la paume de la main.* — La réaction, déjà visible après vingtquatre heures, atteint son maximum d'intensité après quarante-huit heures et commence à régresser à partir du troisième ou du quatrième jour; sa disparition est très lente, et chez certains sujets la modification locale est parfois encore tres appréciable après une dizaine de jours.

Chez les sujets à peau non pigmentée (bêtes bovines de races charolaise et nivernaise, par exemple), la réaction s'accompagne ordinairement de l'apparition d'une petite plaque hémorragique intra-dermique qui est d'abord rouge franc, puis rouge brun, puis légèrement violacée vers la fin, et dont les dimensions varient de celles d'une lentille à celles d'une pièce de 50 centimes ou de 1 franc. Cette plaque prend naissance autour du point de piqûre comme centre, sur la partie culminante de la zone œdémateuse qui caractérise la réaction.

Tout autour de la plaque œdémateuse de réaction locale, la peau a conservé sa souplesse ordinaire; ce qui permet par palpation comparative d'apprécier très facilement l'étendue et l'intensité de la réaction locale.

Chez les sujets sains, la peau conserve toujours sa souplesse normale, même au niveau du point d'injection; de sorte que pour un vétérinaire ou un médecin l'appréciation d'une réaction positive ou d'une réaction négative peut être faite d'emblée, sans éducation spéciale à ce point de vue.

Cette réaction intra-dermique spécifique peut être obtenue sur un point quelconque de la surface du corps, encolure, épaule ou toute autre région; malheureusement, pratiquée dans ces conditions, elle présente les inconvénients reconnus à la cuti-réaction, et que l'un de nous a déjà brièvement signalés. Lorsque la peau est très épaisse, et que son plissement régulier pour l'exploration par palpation est déjà difficile à l'état normal, l'appréciation de la réaction œdémateuse locale devient plus difficile et pourrait aux inexpérimentés laisser de l'incertitude et des doutes. D'autre part, chez les sujets à peau pigmentée, qui forment la bien grande majorité de nos races bovines françaises, la tache hémorragique centrale ne peut pas se voir. Il y a donc là quelques petits inconvénients très réels, qui sont à peu près de même nature que ceux reprochés à la cuti-réaction, et qui pourraient arrêter l'application pratique du procédé.

Aussi nous sommes-nous efforcés, non pas de modifier la technique d'épreuve, mais bien de chercher une région d'élection pour l'injection intra-dermique.—Cette région, nous l'avons découverte sans trop de difficultes, et les résultats de l'opération deviennent alors tellement faciles à apprécier

qu'ils peuvent être reconnus par les personnes les plus ignorantes et les moins averties.—Il suffit de voir.

Il existe chez tous les sujets de l'espèce bovine, à la base de la queue, et allant de cet appendice à la marge de l'anus, deux plis cutanés latéraux, au niveau desquels la peau est très fine, très souple, non recouverte de poils et pourvue d'un tissu conjonctivo-élastique sous-cutané très abondant.

Lorsque l'injection intra-dermique de la tuberculine (2 à 4 gouttes de tuberculine à 1, 10e), est faite dans l'un de ces plis, de préférence à la partie supérieure ou moyenne, la réaction se fait identiquement semblable à celle d'une autre région de la peau, si elle est positive; et reste sans effet aucun si elle doit être négative. Vingt-quatre heures après l'épreuve, le résultat est déjà très net et très facilement appréciable, mais là encore le maximum est atteint vers la quarante-huitième heure. Si ce résultat est positif, il suffit de soulever légèrement la queue pour constater que le *pli sous-caudal soumis a l'épreuve a doublé ou triplé d'épaisseur*, alors que l'opposé est reste exactement ce qu'il était au debut.

La comparaison des deux plis saute aux yeux, le resultat est fidelement enregistre pour tous.—D'ordinaire, l'infitration œdémateuse du pli sous-caudal prend une forme ovoïde au niveau du point de piqûre de l'aiguille, pour atteindre les dimensions d'une noisette, d'une amande ou d'une noix; dans d'autres cas, l'infiltration descend dans la hauteur du pli cutané le transformant en bourrelet allongé.

Et si enfin l'injection a été faite un peu trop bas, l'infiltration œdémateuse gagne latéralement et du côté correspondant la marge de l'anus, donnant à cet orifice un aspect un peu déformé et dévié. *La palpation du pli sous-caudal en état de réaction, par comparaison avec le pli opposé normal, donne la sensation tres nette d'une infiltration cutanée et sous-cutanée* dont la sensibilité varie quelque peu avec les sujets.—A partir du quatrième jour, la réaction entre en décroissance, la tension des tissus diminue lentement, mais elle peut rester visible durant une quinzaine, pour une personne habituée.

Chez les sujets non tuberculeux, l'injection reste sans effets, les deux plis cutanés conservent leur aspect primitif leur souplesse et leur mobilité. La palpation comparative ne révèle rien, sinon une petite induration du volume d'un grain de blé, au niveau de la piqûre, mais qui disparaît très rapidement alors que la réaction positive persiste.

Bien que la région d'injection soit une région exposée à de multiples souillures, nous avons toujours fait ces injections sans antisepsie locale préalable, et nous pensons que dans la pratique il n'y aura aucun inconvénient à opérer ainsi; le nombre de nos inoculations nous paraissant assez élevé pour l'affirmer.

En somme, sans qu'il soit besoin de savonner, de raser, de frotter ou de

scarifier, on peut avec une très grande rapidité et une très grande sureté, ainsi que nous le signalerons plus loin dans le tableau de notre statistique, déceler l'existence des tuberculoses latentes ou cachées par un procédé extrêmement simple, qui fait du même coup disparaître les multiples précautions et obligations soit de l'injection sous-cutanée de tuberculine, soit des ophtalmo et cuti-réactions.

Chez quelques sujets ayant réagi de façon positive, mais non chez tous, il se produit parfois au niveau du point de piqûre une petite escarre superficielle des dimensions d'une pièce de 50 centimes ou de 1 franc. L'escarre apparaît au bout de cinq à six jours, sous forme d'une petite croûte brune qui se détache lentement en dix à quinze jours.

RÉSULTATS DES INJECTIONS INTRA-DERMIQUES DE TUBERCULINE CHEZ LES BOVIDÉS.

Races.	Adaptation.	Réaction à l'Injection Intradermique.	Controle de la Réaction Précédente par l'Injection Sous-cutanée.	Autopsie.
No. 1. Génisse charolaise, 2 ans. Reconnue tuberculeuse par injection souscutanée de tuberculine en mai 1908.	Bête d'expérience.	R. positive très nette (4 août 1908).	R = 2°,5. (12 août 1908).	Tuberculose des ganglions rétro-pharyngés et bronchiques. Pas d'autres tubercules visibles ailleurs.
No. 2. Vache bretonne, 4 ans. A reçu sous la peau de la tuberculose humaine qui a fait des lésions locales.	Bête d'expérience.	R. positive très nette (4 août 1908).	R = 1°,4. (12 août 1908).	Simples lésions locales sous-cutanées aux points d'inoculation. Pas de lésions ganglionnaires ou viscérales.
No. 3. Taureau normand, 4 ans. A reçu sous la peau de la tuberculose humaine qui a fait des lésions locales.	Bête d'expérience.	R. positive modérée (4 août 1908).	R = 1°,1. (12 août 1908).	..
No. 4. Vache hollandaise, 7 ans. Œsophagite ancienne guérie.	Sujet de clinique.	R. négative (4 août 1908).	R = nulle. (12 août 1908).	..

RÉSULTATS DES INJECTIONS INTRA-DERMIQUES DE TUBERCULINE CHEZ LES BOVIDÉS. —(*Continued.*)

RACES.	ADAPTATION.	RÉACTION À L'INJECTION INTRADERMIQUE.	CONTROLE DE LA RÉACTION PRÉCÉDENTE PAR L'INJECTION SOUS-CUTANÉE.	AUTOPSIE.
No. 5. Bœuf charolais, 7 ans. Diarrhée chronique.	Sujet de clinique.	R. négative (4 août 1908).	R = 0°,4. (12 août 1908).	Pas de lésions tuberculeuses. Lésions intestinales de diarrhée chronique, lésions athéromateuses de l'endocarde et de l'aorte, ganglions intacts.
No. 6. Vache normande, 6 ans. Arthrite du grasset.	Sujet de clinique.	R. négative (4 août 1908).	R=0°,4 (12 août 1908).	Arthrite plastique du grasset droit. Pas de tuberculose.
No. 7. Génisse race de Salers, 2 ans. Tuberculose expérimentale.	Sujet d'expérience.	R. positive (8 août 1908).	..	..
Nos. 8, 9, 10, 11, 12, 13. Sujets de race de Salers, 2 ans. Tuberculose expérimentale.	Sujets d'expériences.	R. positive chez tous (8 août 1908).	..	..
No. 14. Vache normande âgée. Reconnue tuberculeuse depuis longtemps, par des injections répétées de tuberline.	Sujet d'expérience.	R. positive mais modérée (8 août 1908).	..	..
Nos. 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34.	Bêtes laitières en plein état de ren-	No. 19. Vache flamande âgée. Réaction positive. No. 23. Vache hollandaise âgée. Réaction positive. No 32. Vache hollan daise âgée. Réaction positive.	R. positive $\frac{41°,3}{38°,6}$ R = 2°,8 (18 août 1908).	

RÉSULTATS DES INJECTIONS INTRA-DERMIQUES DE TUBERCULINE CHEZ LES BOVIDÉS — (*Continued.*)

RACES.	ADAPTATION.	RÉACTION À L'INJECTION INTRADERMIQUE.	CONTROLE DE LA RÉACTION PRÉCÉDENTE PAR L'INJECTION SOUS-CUTANÉE.	AUTOPSIE.
Vaches laitières en état de rendement et appartenant aux trois races normande, flamande et hollandaise.	dement et en parfait état d'embonpoint.	Baisse modérée de la quantité du lait le 2e jour seulement. Toutes les autres sans exception ont donné un résultat négatif. (14 août 1908).	..	..

Sur 20 vaches laitières, trois réagirent nettement, une seule présenta une diminution appréciable de lait et une température de 39°. L'opération d'inoculation n'a pas demandé plus de 30 minutes pour les vingt bêtes et le relevé du résultat pas plus de cinq minutes pour l'ensemble.

Nos. 35, 36, 37, 38, etc. à 70. Bœufs de travail de 9 à 1200 kilos; de 5 à 10 ans tous de race charolaise, et tous en excellent état d'embonpoint. Il y a eu en 1905 des cas de tuberculose dans l'étable. Aprés tuberculinisation tous les animaux ayant réagi et même les suspects furent réformés et remplacés par des sujets sains. Les animaux ne séjournent pas en moyenne plus de 4 à 5 ans dans l'exploitation. La totalité des inoculations n'a pas demandé plus d'une minute par bête, et l'examen des résultats pas plus de dix minutes pour l'ensemble.	Sur ce total de 36 bœufs, six animaux réformés pour usure sont préparé pour la boucherie. Tous les autres sont en plein service de travail régulier.	No. 47. Réaction trés nette. (14 août 1908). Sur toût l'effectif, un seul réagit positivement, et il est intéressant de signaler que c'est l'un des rares survivants de l'époque où l'étable avait été épurée en 1905.	R. positive. 41°,5 38°,9 R = 2°,6	L'abatage des six animaux préparés pour la boucherie démontra que aucun d'eux n'était atteint de tuberculose. L'abatage du sujet ayant réagi décela des lésions très faibles du poumon et des ganglions bronchiques.

Espèce porcine. — Chez les animaux de l'espèce porcine, on n'avait pas jusqu'à ce jour signalé de moyen réellement pratique de déceler la tubercu-

lose. On a bien dit et démontré que l'injection de tuberculine pouvait donner des résultats identiques à ceux obtenus pour l'espèce bovine; mais vraiment il s'agit d'animaux par trop indociles pour qu'on puisse facilement enregistrer les réactions thermiques par le thermomètre et recourir à ce moyen

L'ophtalmo-réaction n'est pas non plus facile à exécuter, et il est encore plus délicat d'en enregistrer les résultats.

Quant à la cuti-réaction, elle n'a pas non plus à notre connaissance été utilisée dans un but pratique.

Cependant, si la tuberculose porcine n'est pas inscrite dans notre loi sanitaire, on ne peut nier que, pour les éleveurs, il n'y ait parfois un très gros intérêt à savoir s'ils ont ou non de la tuberculose, et s'ils en ont beaucoup ou peu dans leurs exploitations.

Lorsqu'un premier cas par exemple a été découvert dans une porcherie, et que de nombreux animaux ont vécu en commun, ou ont été nourris de façon identique, ce qui arrive très souvent, il y aurait intérêt immédiat à savoir quel est le nombre des tuberculeux pour s'en débarrasser aussitôt d'un seul coup. Le porc est un animal qui peut être consommé à tout âge, qui peut être sacrifié sans pertes appréciables quel que soit son poids; il est donc utile en toutes circonstances de pouvoir découvrir les tuberculeux pour les éliminer sans délais.

Or, ici, notre méthode d'intra-dermo-réaction nous a été d'application relativement facile, étant donné ce que nous connaissions pour l'espèce bovine.

Nous avons utilisé l'injection de $\frac{1}{10}^{e}$ de centimètre cube de tuberculine brute diluée $\frac{1}{10}^{e}$ pour des animaux de tous poids, depuis 20 kilogrammes jusqu'à 150 à 160 kilogrammes.

Après exploration méthodique des régions qui nous paraissaient préférables pour ces injections, nous avions tout d'abord porté notre choix sur la région cutanée située immédiatement en arrière de l'oreille. Là même chez les animaux gras, la peau forme quelques plis qui conservent toujours assez de souplesse et d'elasticité pour une pareille épreuve.

Après quelques essais, et même des résultats positifs absolument démonstratifs, nous avons estimé, pour que la réaction positive fût plus visible et plus facilement appréciable, qu'il valait mieux faire l'inoculation sur la base même de l'oreille, là où la peau a conservé encore assez de mobilité.

La technique de l'injection se fait exactement de la même façon que pour l'espèce bovine, et sans trop de difficultés, bien qu'elle soit plus délicate en raison de la très faible épaisseur du derme.

Seule l'indocilité des sujets est un obstacle à la rapidité d'action.

Cependant, c'est encore là un détail d'ordre secondaire. Pour les animaux adultes ou de gros poids, nous les faisons simplement immobiliser en

position debout suivant le procédé signalé depuis longtemps par l'un de nous,* procédé qui consiste tout simplement à passer une longe en nœud coulant en arrière des canines sur la mâchoire supérieure, et à amarrer cette longe à un anneau ou un poteau. Si l'on opère le long d'un mur, l'animal reste le long du mur, tire modérément en arrière, et l'opérateur peut agir tout à son aise sans craindre des mouvements de défense. Pour les petits animaux, on peut faire immobiliser à volonté en position debout ou en position couchée.

Lorsque dans ces conditions on soumet à l'épreuve des animaux sains, il ne reste pas trace de l'inoculation, il n'y a pas de modification de l'état général, et dans les jours qui suivent on ne découvre même plus le point de piqûre.

Lorsque au contraire il s'agit d'animaux tuberculeux, à quelque degré que ce soit, il se produit au niveau de l'inoculation, parfois immédiatement après ou dans les heures qui suivent, toujours en moins de vingt-quatre ou quarante-huit heures, une tache circulaire rouge vif d'abord, rouge brun dans la suite, puis violacée plus tard. Cette tache, des dimensions primitives d'une tête d'épingle, puis d'une lentille, puis d'une pièce de 50 centimes ou de 1 franc, n'est pas due, comme on pourrait le croire, à une piqûre de veinule sous-cutanée s'accompagnant d'une petite infiltration sanguinolente progressive des tissus; elle est la caractéristique objective primitive de la réaction. — Elle s'accompagne d'ailleurs, comme chez les bovidés, d'une infiltration œdémateuse intra-dermique et sous-cutanée des dimensions d'une noisette ou d'une amande.

Au niveau de la nuque, en arrière de la base de l'oreille, cette infiltration reste très facilement appréciable par la palpation; mais sur la base de l'oreille elle-même elle devient si facilement visible, elle se détache si nettement des parties avoisinantes, qu'il n'y a même plus besoin de toucher. La seule comparaison des sujets sains et des sujets ayant réagi donne une certitude.

Là, elle se montre sous forme d'un œdème en macaron qui surplombe les régions avoisinantes et s'en détache nettement.

La plaque œdémateuse est généralement entourée d'une aréole rosée dont les dimensions peuvent dépasser celles de la paume de la main et gagner toute la base de l'oreille.

La réaction commence d'ordinaire à diminuer d'intensité dès le troisième jour et elle s'atténue rapidement pour l'infiltration œdémateuse; mais la tache hémorragique peut-être encore visible le quinzième jour.

Il ne faudrait pas, bien entendu, au moment de la pratique de l'injection intra-dermique de tuberculine, fausser l'épreuve en piquant directement sur une veinule de l'oreille. Ce qui serait d'ailleurs très facile à apprécier parce que des gouttelettes de sang viendraient sourdre à l'orifice de piqûre. Cet

* Moussu: "Les Maladies du Bétail."

accident ne doit pas arriver, et suffirait à indiquer qu'il faut recommencer l'épreuve en un autre point.

Les animaux ne sont pas indisposés: l'opération en elle-même exige à peine deux à trois minutes pour chaque sujet, juste le temps nécessaire pour l'immobilisation, et, pour ce qui regarde la constatation des résultats elle peut être faite à volonté à partir de la trentesixième heure jusqu'à la quarante-huitième heure et même durant les jours qui suivent. Le simple examen des animaux à distance, et encore mieux la palpation pour plus de certitude, donnent immédiatement une conviction.

Comme pour les animaux de l'espèce bovine, il n'est aucun besoin de prendre des températures, d'immobiliser longuement les sujets, de venir à de multiples reprises les inquiéter, les manipuler ou les explorer; rien de tout cela n'est nécessaire. La constatation du résultat peut être appréciée en quelques minutes chez un grand nombre d'animaux, parce qu'elle est visible, parce qu'elle saute aux yeux de l'homme le moins averti.

Pour les animaux de l'espèce porcine, nous estimons qu'il y a là un procédé très nouveau et qui donnera toute satisfaction jusqu'à découverte plus perfectionnée s'il est possible, puisque aucune des méthodes jusqu'ici utilisées n'avait réellement de valeur pratique.

Cependant, il nous faut noter que chez les sujets à peau pigmentée et à oreilles noires (races de Berkshire par exemple, et variété porcine de Saint-Yriex en France; ou leurs produits de croisement) la réaction positive telle que nous la signalons serait beaucoup plus difficile à apprécier. La vue ne permettrait plus seule d'en voir la modalité et l'intensité, il faudrait forcément recourir à l'appréciation par palpation manuelle. Cette dernière peut parfaitement suffire, en dehors de tout caractère objectif, parce qu'elle est toujours très caractéristique et très nette. Il y aurait d'ailleurs la ressource de chercher un autre point de la surface du corps où la peau ne serait pas pigmentée. Et ce sont là des conditions qui ne représenteront jamais que des exceptions.

ÉPREUVE DE L'INTRA-DERMO-RÉACTION CHEZ LES PORCS.

Numéros.	Épreuve à l'intra-dermo-réaction.	Autopsie.
No. 1. Porcelet de 3 mois. A séjourné avec un sujet à infection purulente. A reçu des cultures de rhumatisme (?) Sujet d'expériences.	Pas de réaction.	Pas de tuberculose.
No. 2. Porcelet de 3 mois, ayant présenté des signes de broncho-pneumonie, guéri.	Pas de réaction.	..

ÉPREUVE DE L'INTRA-DERMO-RÉACTION CHEZ LES PORCS.—(*Continued.*)

NUMÉROS.	ÉPREUVE À L'INTRA-DERMO-RÉACTION.	AUTOPSIE.
No. 3. Porcelet de 3 mois environ, atteint d'ictère.	Pas de réaction.	Hépatite. Pas de lésions de tuberculose.
No. 4. Verrat d'un an, en séjour dans une porcherie infectée de tuberculose.	Réaction positive très nette (injection en arrière de l'oreille).	..
No. 5. Verrat de 6 mois, même porcherie.	Réaction nulle.	..
Nos. 6, 7 et 8. Jeunes truies de 6 mois destinées à la reproduction.	Réaction positive modérée pour le no 6. Réaction nulle pour les nos 7 et 8.	..
No 9. Porc gras prêt pour l'abatage.	Réaction positive très nette.	Tuberculose des ganglions sous glossiens, bronchique droit et hépatique. Quelques nodules tuberculeux, dans le foie ganglions mésentériques indemnes.
No. 10. Truie nourrice âgée de 2 ans.	Pas de réaction.	..
Nos. 11, 12, 13. Truies réformées âgées de 2 ans.	Réaction positive sur toutes.	..
No. 14. Porc âgé de 6 mois.	Réaction négative.	..
Nos. 15, 16, 17, 18, 19, 20, 21, et 22. Jeunes porcs de 5 mois.	Réaction négative pour tous.	..
No. 23. Truie âgée de 8 mois, en gestation.	Réaction positive.	..

Chèvres et moutons.— Bien que l'on ait assez rarement à enregistrer et surtout à rechercher la tuberculose de la chèvre, et encore moins celle du mouton, il nous a paru utile, nos ressources de laboratoire nous le permettant, de préciser ce que donnerait chez ces animaux l'intra-dermo-réaction.

Chez des chèvres à tuberculose spontanée et à tuberculose expérimentale, nous avons tout d'abord opéré comme chez les bovidés, c'est-à-dire par inocu-

lation intra-dermique en un point de la surface du corps—(région de l'épaule) et ensuite par inoculation dans un pli sous-caudal.—Les résultats sont, peut-on dire, exactement calqués sur ceux que l'on voit apparaître et évoluer chez les bovidés. Dans l'épaisseur de la peau de la surface du corps, la tuberculine à la dose de 1 centigramme, diluée à $\frac{1}{10}^{e}$, donne au bout de quarante-huit heures une plaque œdémateuse circulaire, au niveau de laquelle la surface cutanée apparaît en saillie sur les régions avoisinantes et donne au toucher la sensation d'une région modérément douloureuse et infiltrée. Le plissement cutané ne peut plus se faire, alors qu'il est très commode sur le pourtour, permettant ainsi d'apprécier les différences de caractères. Nous n'avons pas vu se développer de plaque rouge au niveau du point de piqûre, peut-être simplement parce que nos animaux étaient de robe foncée et avaient une peau pigmentée.

Dans le pli sous-caudal, l'injection de la même dose de tuberculine provoque comme ailleurs, dans les quarante-huit heures qui suivent, une réaction très vive qui se traduit par de l'infiltration œdémateuse de toute la hauteur du pli, de la moitié de surface sous-caudale correspondante, et quelquefois même de la totalité de la face inférieure de la queue, si l'injection a été faite un peu haut dans l'épaisseur du pli. La peau prend généralement une teinte rosée légère, comme dans un début d'engorgement érisypélateux, et à la palpation la sensation est très différente de celle de l'état normal. Chez les chèvres et les moutons, en effet, la peau est tellement fine, et le tissu sous-cutané tellement souple, que le plissement cutané dans la région sous-caudale donne une sensation très spéciale, qui diffère totalement de celle recueillie sur la même région lorsqu'elle est œdémateuse. — Il nous a semblé que la disparition de la réaction se faisait plus rapidement que chez les bovidés ou les porcins, car vers le cinquième ou sixième jour cette réaction, dans nos observations, était presque totalement éteinte.

Nos observations ne sont qu'au nombre de dix, il est vrai, et nous n'avons non plus jamais observé la formation d'escarres, pas plus chez la chèvre que chez le mouton.

EPREUVES DE L'INTRA-DERMO-RÉACTION À LA TUBERCULINE CHEZ DES CHÈVRES ET DES MOUTONS.

Espèce.	Adaptation.	Réaction à l'Injection Intradermique de Tuberculine.	Réaction à l'Injection Sous-cutanée de Tuberculine.	Autopsie.
No. 1. Bouc âgé de 3 ans, ayant subi des injections sous-cutanées de tuberculine humaine.	Animal d'expérience.	R. positive (4 août 1908).	R. positive de 39° à 40°:7 R. 1°,7 (12 août 1908).	..

ÉPREUVES DE L'INTRA-DERMO-RÉACTION À LA TUBERCULINE CHEZ DES CHÈVRES ET DES MOUTONS.—(*Continued.*)

ESPÈCE	ADAPTATION.	RÉACTION À L'INJECTION INTRA-DERMIQUE DE TUBERCULINE.	RÉACTION À L'INJECTION SOUS-CUTANÉE DE TUBERCULINE.	AUTOPSIE.
No. 2. Bouc âgé de 5 ans. A subi des tentatives de vaccination par cultures *in vivo* dans le péritoine.	Animal d'expérience.	R. négative (4 août 1908).	R. de 0°,6 (12 août 1908).	..
No. 3. Bouc âgé de 2 ans. A vécu avec une chèvre morte tuberculeuse. (Amenée à la clinique bovine).	Animal de clinique.	R. positive (4 août 1908).	R. positive 40°,7 — 39°,2 R = 1°, 5 (12 août 1908).	..
No. 4. Chèvrette de 18 mois, fille de chèvre morte tuberculeuse.	Animal de clinique.	R. positive (4 août 1908).	R. positive 41°,5 — 39°,2 R = 2°,3 (12 août 1908).	..
No. 5. Brebis southdown, âgée de 5 ans. A reçu sous la peau des bacilles de tuberculose humaine.	Animal d'expérience.	R. positive très forte.	..	..
Nos. 6 et 7. Agneaux atteints de cénurose.	Sujets de clinique.	R. nulle.	..	Cénurose pas de tuberculose.
Nos. 8 et 9. Agneaux atteints de strongylose gastro-intestinale.	Sujets de clinique.	R. nulle.	..	Strongylose, pas de tuberculose.
No. 10. Agneau sain.	Sujet d'expérience.	R. nulle.	..	..

En résumé, l'intra-dermo-réaction à la tuberculine nous a semblé être chez les animaux une épreuve d'une sensibilité parfaite, avec l'avantage énorme de pouvoir être appliquée sans difficulté à toutes les espèces domestiques.

Basée sur l'injection d'une quantité dosée de tuberculine, que l'on sait devoir être forcément absorbée par l'organisme, puisque cette injection se fait dans l'épaisseur des tissus vivants, elle a tous les avantages de l'injection

sous-cutanée sans présenter les inconvénients qui se rattachent aux autres procédés, en particulier à l'ophtalmo–et à la cuti-réaction.

L'ophtalmo-réaction, cela est établi aujourd'hui, peut exposer à des erreurs assez nombreuses; elle peut être gênée et empêchée par un larmoiement exagéré qui balaie la tuberculine, alors qu'il ne s'agit cependant que d'une simple sensibilité individuelle; elle peut paraître positive chez des sujets non tuberculeux dont l'irritabilité conjonctivale est exagérée; et elle a enfin l'inconvénient énorme d'agir sur un organe extrêmement délicat, dont on hésite toujours à troubler le fonctionnement régulier. Si l'on ajoute à ces données ce dernier fait qu'une conjonctive intense consécutive à une épreuve de tuberculine n'est pas par elle-même caractéristique, mais qu'il faut en plus pour que la réaction soit considérée comme positive, que l'inflammation conjonctivale, d'après certains auteurs, aboutisse à la suppuration, on saisit sans peine toutes les difficultés d'interprétation de la réaction oculaire.

Pour ce qui est de la cuti-réaction, qu'elle soit recherchée par frottement à la tuberculine sur une surface récemment rasée, comme l'a indiqué Lignières, ou par scarifications, elle présente toujours d'assez nombreux inconvénients déjà signalés par l'un de nous.*

Si la peau est trop fine ou trop épaisse, si les scarifications ne sont pas proportionnées à l'épaisseur de cette peau, si le suintement consécutif est plus ou moins abondant, si la peau est pigmentée, les résultats obtenus peuvent varier. Il est facile de comprendre d'ailleurs qu'il s'agit d'une épreuve un peu incertaine dans ses effets, suivant l'habileté de l'opérateur, puisque la quantité de tuberculine agissante ne peut être dosée et peut varier.

Les recherches faites ont démontré d'autre part, de l'aveu même de l'inventeur de la méthode (Pirquet), que les résultats n'étaient pas toujours ce qu'ils devraient être, et qu'il y avait en somme un pourcentage assez élevé d'erreurs enregistrées.

Enfin, pour ce qui concerne les animaux, si l'ophtalmo-réaction est d'une application relativement facile, elle exige cependant une certaine main-d'œuvre assez délicate; et pour ce qui concerne la cuti-réaction, le seul fait de l'obligation de raser la peau sur une surface déterminée complique l'intervention. — Ces désavantages seraient sans importance, bien entendu, si le résultat devait dans tous les cas être certain; il nous paraît inutile d'insister, l'expérience ayant prouvé le contraire.

D'où il résulte qu'à l'heure actuelle c'est toujours l'injection sous-cutanée de tuberculine, qui, en vétérinaire donne le maximum de certitude dans les résultats obtenus.

Cependant cette pratique a, elle aussi. ses désavantages, et ils sont nom-

* Moussu: Sur la cuti-réaction chez les bovidés tuberculeux (Société centrale vétérinaire, 15 juillet 1907).

breux. Il faut tout d'abord que les animaux soient immobilisés à l'étable pendant au moins deux ou trois jours, ce qui est souvent un gros inconvénient pour des bêtes de travail, des bêtes d'élevage, ou même des bêtes laitières à l'herbage. Il faut ensuite que ces animaux ne soient pas fébricitants, qu'il n'y ait pas de périodes de rut, etc., etc.

Si l'on ajoute à tout cela la besogne énorme et fastidieuse qui incombe au vétérinaire opérateur pour les relevés de température, et pour une rétribution pécuniaire forcément faible, on comprendra sans peine pourquoi l'emploi de la tuberculine n'est ordinairement tenté que dans les exploitations rurales dont l'effectif bétail est suffisant.

Avec l'intra-dermo-réaction il n'est plus question de tout cela, puisqu'il ne s'agit que de provoquer ou non, une *réaction locale* qui exigera un simple coup d'œil pour savoir si elle sera positive ou négative.

Il n'y a plus à redouter que la tuberculine soit enlevée par un larmoiement excessif ou le saignement exagéré de scarifications, il n'y a plus à prendre de relevés de température ou la crainte d'avoir des élévations thermiques tenant à d'autres causes.

Les animaux au pâturage, les animaux de travail, les vaches en périodes de chaleur ou même fébricitantes peuvent sans inconvénients être soumis à l'épreuve; rien n'est changé dans leur manière de vivre, et la réaction locale si elle se produit, n'aura plus besoin d'être enregistrée à heure fixe après un temps donné. L'opérateur aura tout le loisir, entre la trente-sixième et la quarante-huitième heure, et même encore pendant les jours qui suivront, de venir jeter un coup d'œil sur les animaux qu'il aura inoculés.

Au point de vue pratique, nous pensons donc que la main-d'œuvre a été réduite au minimum possible ainsi que les obligations du clinicien. La quantité de tuberculine nécessaire est insignifiante et le temps d'épreuve, pour peu que les animaux soient maintenus par le personnel chargé de leur donner des soins, ne dépasse guère deux minutes par bœuf ou par vache, et deux à quatre minutes par bête porcine.

Ce sont là des avantages que l'on ne saurait nier et qui, nous l'espérons, seront appréciés dans la pratique de la clientèle.

Nous ne voulons pas soutenir aujourd'hui qu'il n'y aura pas non plus d'inconvénients. Aucune méthode n'est à l'abri de reproches, mais nous serons les premiers à les reconnaître et à les signaler dès que le temps et l'expérience nous auront permis de nous faire une opinion à cet égard.

Conclusions.

Les conclusions qu'il nous paraît possible de tirer de cette étude, sont les suivantes;

1° L'intra-dermo-réaction à la tuberculine, telle que nous l'avons définie, s'est montrée, dans nos recherches, d'une sensibilité parfaite pour dé-

celer la tuberculose chez les espèces animales (espèces bovine, porcine, caprine);

2° L'intra-dermo-réaction positive se traduit par l'évolution d'une manifestation locale, caractérisée par l'épaississement du derme, la formation d'une plaque d'œdème (bêtes bovines), et parfois l'apparition d'une tache rouge centrale (espèce porcine);

3° Cette réaction locale ne provoque pas de troubles généraux d'ordinaire, pas de fièvre ou une fièvre très modérée, pas de perte d'appétit pas ou peu de perte de lait. Elle évolue sans que les conditions ordinaires de la vie des animaux soient changées, et sans qu'il soit nécessaire de prendre aucune mesure ou précaution spéciale;

4° Elle n'a aucun des inconvénients des ophtalmo- et cuti-réactions, et présente tous les avantages de l'injection sous-cutanée de tuberculine:

5° Elle réduit au minimum les obligations de l'opérateur, en supprimant toute manœuvre préparatiore ou complémentaire (prises de température, dénudation de la peau, etc., etc.);

6° Elle est applicable à toutes les espèces animales domestiques.

Die Intradermo-Reaktion auf Tuberkulin bei Tieren.—(MOUSSU UND MANTOUX.)

Die Schlusssätze, die wir es für möglich halten von dieser Arbeit zu ziehensind folgende:

1. Die Intradermo-Reaktion auf Tuberkulin, wie wir sie bezeichnet haben, zeigt sich in unseren Untersuchungen vollkommen empfindlich genug, die Tuberkulose bei Tieren (Rind, Schwein, Ziege) zu offenbaren.

2. Die Intradermo-Reaktion ruft eine lokale Veränderung hervor durch Verdickung der Haut, Oedemflecken (in der Rindgattung), und manchmal die Erscheinung eines zentral gelegenen roten Fleckens (in der Schweingattung).

3. Diese lokale Reaktion verursacht gewöhnlich keine allgemeinen Störungen, wenig oder kein Fieber, keinen Appetitverlust, wenig oder keinen Milchverlust.

Sie entwickelt sich ohne Veränderung in den gewöhnlichen Lebensverhältnissen der Tiere und ohne dass es nötig wäre, irgend welche besondere Massregeln zu treffen.

4. Sie hat keine von den Nachteilen der Conjunktival- und Hautreaktionen und bietet alle Vorteile der subkutanen Einspritzung von Tuberkulin.

5. Sie vermindert sehr die Verpflichtungen des Operateurs, da man ohne Vorbereitungs-oder ergänzende Massregeln (Temperaturnehmen, Hautentblössung, u. s. w.) fertig werden kann.

6. Man kann sie bei jeder Art von Haustieren anwenden.

The Intradermo-reaction to Tuberculin in Animals.—(MOUSSU AND MANTOUX.)

The following are the conclusions which we consider possible to be drawn from this study:

1. The intradermo-reaction to tuberculin, as we have defined it, has shown itself in our investigations quite sensitive enough to reveal tuberculosis in the animals (cattle, hogs, goats).

2. The intradermo-reaction betrays itself by the evolution of a local manifestation, characterized by thickening of the skin, edema (in bovines), and sometimes the appearance of a central red spot (in hogs).

3. This local reaction does not usually cause any general disturbance, causes little or no fever, no loss of appetite, little or no loss of milk.

It develops without any change in the ordinary conditions of the life of the animals and without its being necessary to take any measures or special precautions.

4. It has none of the disadvantages of the ocular and cutaneous reactions, and presents all the advantages of the subcutaneous injection of tuberculin.

5. It reduces the obligations of the operator to a minimum, by dispensing with every preparatory or supplementary measure (taking of temperature, denudation of the skin, etc.).

6. It is applicable to every kind of domestic animal.

EAR-TAGGING MARKETED LIVE-STOCK,

AS A MEANS OF AUTOMATICALLY LOCATING DANGEROUS TUBERCULOUS ANIMALS WHICH CONTAMINATE MILK, AND ECONOMIZING THEIR ERADICATION.

By Dr. Burton Rogers,

Manhattan, Kansas.

Statisticians agree that 10 per cent. of the people in civilized countries die of tuberculosis, and that means at least 160,000 annually in the United States alone. United States published statistics during the past ten years show that over 100,000 tubercular cattle and over 1,000,000 tubercular hogs have been discovered by the Federal veterinary inspectors of this country.

Scientists agree that it would have been impossible for these persons and these animals to have acquired the disease without the entrance of the tubercle bacilli into their bodies. Scientists agree that, except the very rare cases due to heredity and infection through skin wounds, these tubercle bacilli entered by either the mouth or the nostrils or both.

For a long time, and perhaps beginning with the philological need and origin of the word "miasma," scientists have contended, and all the circumstantial evidence which they observed supported it, that the majority of pathogenic microörganisms were inspired from the air through the larynx and trachea directly into the lungs and the alveoli. Indeed, some have said and still maintain that it is the only method by which tuberculosis is contracted under natural conditions. But as an epoch in medical and scientific history, it may yet be proved that practically no disease infections are produced by inspiration into the respiratory tract beyond the larynx, and our former theories on this point may prove to be as fallacious as the theories the post-mortem empty arteries supported before the discovery of the circulation of the blood by Harvey.

Fresh, uncontaminated, pure air is demanded by nature, and it would be hard to conceive of a more perfect ventilating and filtering system than she provides for the purification of the inspired air by the time it reaches the larynx, trachea, lungs, and alveoli. Nature provides a curved course for the air inspired through the nostrils to the larynx, and, in addition, the nostrils are lined by mucous membrane upon which is a cobweb arrangement of cilia, and both are reinforced by a viscid, sticky secretion.

Tuberculous lesions have been found and do exist in animals and men that never did and never will throw off a virulent tuberculous germ. From a strictly sanitary point of view, tuberculous persons and animals, no matter how badly affected, are not dangerous simply because they have the disease. In case the tuberculous germs leave the tuberculous person or animal, the whole danger lies in what becomes of the virulent organisms after they do separate from the tuberculous persons or animals.

To control and eradicate this danger therefore requires a knowledge of how they are thrown off or excreted. It matters not whether the bacilli are forced through without lesions, or whether the pulmonary lymph-nodes transfer them, or whether the tubercles break down—the organisms do reach the alveoli of the lungs.

In milder cases the irritation causes unconscious reflex activity, and, together with pulmonary contraction and expansion, the germs reach the bronchial and tracheal cilia, which carry them to the pharynx, while, in addition to the above, the greater irritation in severer cases results in forcibly and consciously coughing up the organisms to the pharynx.

Up to this point the conditions are practically the same in all animals and man; but from here on the conditions are very different from every point of view. When such material reaches the pharynx of man, he feels that it is injurious to himself, and his reflexes cause him to spit it out. Every bacteriologist knows that this pulmonary material contains tuberculous germs proportionate to the degree of the openness of the disease in that person, and every such person ought to be taught that it is within their will power to collect and effectually destroy every tuberculous germ which they give off in this manner.

But the tuberculous animal, especially the tuberculous cow, coughs up the germs to the pharynx, and the sensation of the pulmonary mass is no different to her than is the "cud" which she brings up in rumination, and reflex action ends in her swallowing it. The organisms pass through the esophagus into one or more or all of the four bovine stomachs, and from there into the intestines. Placing the average amount of feces passed as thirty pounds, microscopical examinations by the United States Bureau of Animal Industry of one random tuberculous animal showed she was passing tuberculous germs at the rate of 35,000,000 daily, or 330 per grain of feces.

How Germs Get into Milk.—One would not stretch one's imagination at all to see cows in some crowded quarters forced to lie down in their own or the manure of some other tuberculous animal, and thus soil their tails, rumps, legs, udders, all of which is by no means uncommon.

Imagine the milker (not much cleaner), with open pail, milking such a cow, and doing so without any attempts having been made to clean off the

manure, especially if the soiled condition is upon the left or non-milking side of the animal. With warm, freshly drawn milk as a culture-medium, imagine a sterile Petri dish, with a diameter of 12 or 13 inches, exposed under the udder of such a cow with the ordinary commotion and for a period equal to the time necessary to milk a cow. A clod of manure falls into the milk-pail, and during the moment it floats, the milker removes it with his fingers, but the little ones he does not bother with or may not see.

Upon such farms there is always the best milk-strainer possible to purchase, for dairymen know people do not want milk with dirt in it. But as perfect as this filter is, it is not a Chamberland bacterial filter. The invisible organic dirt has been washed and dissolved off of the sedimentary, visible, insoluble dirt by the milk and passes through the strainer.

From the above, it will be seen that under present conditions we have absolutely no idea how many bovine tubercle bacilli are being unconsciously consumed with our milk. It is a fundamental principle in science that no absolutely correct conclusion can or should be made concerning any effect, until all of the evidence bearing upon the effect is known. When the bovine tubercle bacillus will experimentally reproduce itself and set up the disease in every other susceptible animal available for experiment; and when circumstantial evidence in a few cases of human tuberculosis points very strongly to tuberculous food animals as the cause; and when all of the positive etiological evidence of other cases of human tuberculosis is not at hand; and until we are sure the bovine tubercle bacillus has not been or is not in our food, can we afford to ignore the scientific and sanitary conclusion that bovine tuberculosis is transmissible to man.

The possibilities of the history of tuberculosis containing an "interesting error," though possibly never to be recognized, are apparent, especially in such a long-time-dormant and slowly progressive disease, where it is impossible to watch the disease process under natural conditions from the time of the primary infection.

Our Dependence on the Farms.—We know our lives are fundamentally dependent upon the farms, but how much our deaths are similarly dependent we do not know, for the farmer has the best of things in the world, and he has never been asked to guarantee the safety of his produce.

But the argument may be set forth that tuberculosis is a city disease, and if the above is true, it ought to be extremely prevalent in rural districts. The prevention and cure of tuberculosis is recognized universally to be best favored by outdoor life and nature, and this is the perpetual environment of the farmer. The farmer is constantly curing himself in creating resisting vitality; yet in spite of this, the Iowa State Board of Control, which was authorized by the State legislature to investigate tuberculosis in Iowa, show in their Bulletin of October, 1904, that 1596 physicians of Iowa re-

ported 3300 cases of consumption, and while the occupations of 429 were not given, and 980 were included in the general term "housewives," there were specified the following among the remainder: 468 farmers, 74 farmers' wives, 33 farmers' daughters, 4 farmers' sons, and 23 farm-hands—or a total of 602 in farm environment.

It is within the will-power of 95 per cent. of the farmers of this country to immediately prove to themselves, and to the whole world, that they are not one of those owning dangerous tuberculous animals. Such a desirable attitude upon the part of 100 per cent. of the farmers who have not already done so would immediately locate all the dangerous tuberculous animals, and thus save the government the expense of locating them in the interests of public health and of the farmers themselves, and with the part of the appropriations thus saved in this manner the unfortunate owners of tuberculous animals could be more fully reimbursed for condemnations and losses.

Tuberculous Meat.—Most meat is heated and cooked sufficiently to destroy the tubercle bacilli, if present; and this fact suggests that the meat of tuberculous animals could be intelligently sterilized. At any rate, scientists advocate the absolute safety of pasteurized tuberculous or suspected milk, and no one can deny that it would be inconsistent not to permit and similarly certify to the greater safety of sterilized non-tuberculous, or even the tuberculous meat of tuberculous food animals. Besides, meat is eaten by adults, but milk is drunk by susceptible babies.

If the recognized facts in science concerning heat and sterilization were applied as advocated here, instead of indefinitely continuing the present practice of condemning and rendering useless the bulk of the animals and their meat, with great losses, these losses could be prevented by giving greater value to the meat, and thus all dangerous living tuberculous animals be encouraged to be marketed immediately and slaughtered.

How to Eradicate.—It shall be the purpose of the rest of this paper to prove how, during the next two years, these dangerous tuberculous animals, as well as the premises from which they came, can be automatically located at nominal cost, and be eradicated (at least intelligently controlled) without cost or loss in excess of present actual losses. Of course, the quickest way to locate every tuberculous animal is to have every one of them, especially cows and bulls, immediately tested with tuberculin by competent, reliable veterinarians.

During the fiscal year 1907, Federal veterinary inspectors discovered 29,835 tuberculous cattle and 430,177 tuberculous hogs among the animals slaughtered. Scientists know that it would have been impossible for these animals to have become tuberculous unless, during their life-time, their atmospheric and other environment or their food contained tuberculous germs which they inspired or ate.

Under present conditions, when these animals are all mixed up, by the time they reach the markets and are slaughtered and inspected it is impossible to know where any animal came from. But if all the animals had been simply tagged with metal ear tags, showing the name and address of the original owner, the tags of an approved type that would remain until the animal was post-mortemed by the inspectors, we would know the premises upon which to make an investigation of the cause.

Let us take the tuberculous hogs alone. Most hogs, except parents, are slaughtered when less than one year of age, and this means that within the past year these hogs have been exposed to contaminating conditions that produced the disease in its varying degrees. The following methods are now recognized as the most common ways in which these hogs acquired the disease, and if there are any additional ways not yet discovered or known, it is incontestable that these are the farms upon which to investigate and find out.

First, and from every point of view, the most important mode of infection is by following tuberculous cattle. Many cattle are followed by hogs and associated with them in the same pens for varying lengths of time. Hogs are also put into pens, stables, and quarters after cattle have been taken out.

Now, keep in mind the manner in which dangerous tuberculous cattle give off their germs in the feces. Agricultural economy in animal husbandry has proved that it is profitable to have omnivorous hogs secure a part of their ration from the partially nutritious droppings of cattle, especially if the cattle are overfed and undigested food passes through with the feces. Therefore, hogs are encouraged to, and do satisfy their voracious appetites by snooting and rooting in and devouring the droppings of feces of cattle, and as a result become tuberculous proportionate to the degree of their individual resistance and the numbers of virulent tubercle bacilli in the feces.

All these animals test the degree of dangerousness of the environment to which they were exposed, and of the food which they ate. The environment and similar food is still left for other hogs and man and babies. No more accurate and finer feeding test could be purposely arranged for and conducted by scientists than this one going on naturally—yet no advantage is being taken of it.

And what evidence is there to support this?

In the summer of 1904, while a Federal veterinary inspector in an Iowa town, the writer tagged 3430 of the hogs that were brought to the packing-house in individual wagons by the individual farmers within a radius of 20 miles. These hogs were slaughtered separately from car-load lots of shipped-in hogs, and during the experiment only 39 of the 626 different farmers in an exceptionally bad tuberculous district brought in all of the tuberculous hogs.

Last winter (1907–08) the assistant State veterinarian stated that in testing the cattle upon only 15 of the farms from which tuberculous hogs came, he found tuberculin-reacting cattle in every instance. The others would no doubt be the same.

Last winter the experiment station at Ames, Iowa, knowingly and purposely forced 28 healthy pigs to follow non-reacting tuberculin-tested, and therefore healthy, cattle in the same feed lot or pens; and likewise forced 20 other healthy pigs to follow cattle that had reacted positively to the tuberculin test, and were therefore tuberculous. A few months later the hogs were slaughtered and inspected, and none of those following the healthy cattle were tuberculous, while 21 out of the 28 following the tuberculous cattle were tuberculous.

Not only did the tuberculin, but so did the hogs test the cattle. And so did the 430,177 tuberculous hogs condemned by Federal inspectors test similar conditions on unknown farms.

If the degree of tuberculosis in the hogs is proportionate to the number of virulent tubercle bacilli in the feces eaten by the hogs, then the degree of the dangerousness of the milk (and its final products unconsciously consumed by man) is similarly proportionate when contaminated with these same feces. When practically every one of the five or six million farms of this country have hogs following and associating with the cattle; and when practically every farmer markets one or more hogs every year; and when the bulk of these hogs go to packing-houses where two thorough post-mortem examinations are made for tuberculosis of every hog killed—it is undoubtedly desirable to have every hog going to market tagged, either voluntarily or by law, so that we can locate these few premises that are a menace to the health of our people, especially of the children and babies, who must drink milk from such sources as are described here. These few farms are blighting the whole live-stock industry and its products.

Science has previously erred in giving prominence to the assumption that tuberculous cows secrete tuberculous milk, and (unconsciously) ignored the more important sanitary fact that tuberculous animals, both male and female, may manifestly to a greater degree contaminate milk with bovine tubercle bacilli.

Then what shall be done after the location of the tuberculous premises?

In every instance all the cattle upon the place should be immediately tested with tuberculin by an honest, reliable veterinarian, and preferably an official one. Tuberculin will nearly always indicate the tuberculous and the non-tuberculous, so that they can be separated from each other. Tuberculin, while it is recognized that no diagnostic agent for any purpose excels it in accuracy, has proved not to be absolutely infallible, and therefore the results of the tuberculin test need not or should not be considered wholly reliable in itself, for the following reasons:

Objections to Tuberculin.—Tuberculin (being the filtered laboratory excrement of the tuberculosis germ when grown in culture-media, and when the regular and generally most satisfactory dose is only 2 c.c. of the diluted standardized tuberculin) may be injected into an animal which has already within its system such a large quantity of natural tuberculin manufactured by the tuberculous germs in immense numbers in its system, the 2 c.c. is without the characteristic effect, if any at all. Such animals usually show marked physical and clinical evidence of the disease, but some animals, especially bulls of very strong vigor and vitality, may withstand, up to a certain extent, the physical effects of the disease and its products. Therefore, the unfortunate result is that at times such animals may still be left with the healthy cattle and in the same quarters unconsciously.

Now, on the other extreme, tuberculin is so delicate that it will cause a reaction in animals which have only one little tubercle the size of a pea or less in one unimportant lymph-gland, and reacting animals of varying values have been slaughtered in which not a single lesion could be found at post mortem by expert veterinarians. In such cases the conclusion is generally offered that the tuberculin could not possibly have erred, but that there must exist a lesion somewhere, even though it could not be found, or was overlooked by the expert.

So, after tuberculin has done its duty as far as extreme accuracy is concerned, it would seem advisable to supplement it again, if possible, as a check upon its great delicacy and accuracy for economic, practical, scientific, and real sanitary purposes.

If the animals are extremely valuable, each animal should be constantly, or at least intermittently, kept in a separate pen with one or more young pigs. Or the feces of each animal could be gathered from the regular stall of each animal, and be fed to such hogs, tagged and numbered and kept in small separate pens. The slime from the separators might be fed to hogs or to one hog also.

The hogs should be slaughtered in due time under the supervision of a veterinarian, either by making previous arrangements as to dates, or taken to regular packing-houses. As a result, the degree of the disease in each hog will proportionately determine the degree of the dangerousness of the bovine it followed, or of the feces it was fed.

Some of the hogs may not show any lesions at all, and this means that the tuberculin-reacting bovine with which they have associated or ate the feces of was not giving off, or throwing off, or excreting any tuberculous germs, and this bovine was, therefore, not necessarily dangerous from a sanitary point of view. Such a thing might occur as that only one or two of the tuberculin-reacting cattle might produce the disease in the hogs associating with them and eating their feces, and these hogs may be tuberculous in any degree conceivable.

Thus far this seems to be the best method proposed that will permit of the same important conclusion before death that a post-mortem would reveal. By such a hog-association-test there might be saved to the wealth of the country a large number of animals which are at present destroyed.

Any animal which will produce tuberculosis in hogs by this method of exposure is a dangerous animal, and public health interests can rightfully demand that such an animal shall be destroyed at private or public expense, or at least be so intelligently quarantined or controlled that none of the tuberculous organisms it gives off will ever reach another animal or man in a virulent reproductive condition.

Every intelligent live-stock owner could, no doubt, be easily convinced that, upon the demonstration of one or more such animals in his herd, these animals will, no doubt, finally die of the disease, and in addition to this also cause the disease in and the death of other animals in the herd if he keeps them long enough. And it would be profitable in the long run to dispose of the animals immediately, or at least put them under intelligent control, if they possess other qualities desirable to perpetuate.

As a result, more could be done toward the eradication of dangerous tuberculous animals than has been accomplished during all the twenty-five years of the campaign in behalf of tuberculin as the only method—and this does not disparage the undeniable value of tuberculin.

Pure Food Law.—Upon our statute-books there exists the Pure Food and Drugs Act of June 30, 1906, the spirit and intent of which is that everything, especially that which will be ultimately consumed, shall be sold upon its merits—for what it is; and that it shall be edible and free of disease, and shall not be dangerous or deleterious to health. Therefore, every ounce of meat or meat produce which leaves packing-houses for interstate trade must be labeled "U. S. Inspected and Passed," together with the number and name of the abattoir or packing-house from which it came.

During the fiscal year 1907 alone, of the 50,935,216 live animals coming from the farms of this country and slaughtered and inspected in packing-houses having Federal inspection, 151,772 whole carcasses, and "parts" of 529,876 other carcasses, were condemned; of which whole carcasses 84,991 were tuberculous, and of the parts of carcasses, 375,093 were tuberculous, and were therefore condemned and not allowed for food, although the farmers sold them and the packers bought them for that purpose.

It would seem that the legislation in the Act of June 30, 1906, would be sufficient, if brought to their attention, for the Executive, through the Secretary of Agriculture, who is authorized and responsible for the making and enforcing of regulations upon this law, and backed by the courts, to require at once that all live-stock entering interstate trade shall be tagged with the name and address of the owner, in order that these animals, in the

first place, shall be sold on their merits and be guaranteed by the producer; and, in the second place, if the animals are found to be diseased, that the cause of the condition can be traced back to the farm and located for the purpose of making all dairy produce—the most important of all foods from a sanitary point of view—safe.

Since tuberculosis cannot be immediately recognized or even suspected in the living animal without the use of the individual two-day tuberculin test, then, in order to be sure that tuberculosis does not exist in any animal, it would be necessary to apply the tuberculin test to every animal upon every one of the between five and six million farms of this country. This is very plainly an immense undertaking, and would take several years and an immense sum of money.

Indeed, this might cost more than the government did or could appropriate, and more than the actual value of the tuberculous animals, and besides leave nothing to reimburse the owners for losses and condemnations sustained. This feature always looms up, and influences are brought to bear that retard proposed legislation.

Would it not be far more economical to pass laws prohibiting inter- and intra-state traffic in untagged live-stock, and then furnish the tags, and even the tag fasteners themselves, upon application from the farmers, and provide penalties for attempts to evade the purpose of it? The law would indirectly force them to make application for tags.

Even with such a law, without any appropriations, the present expense of the powerful meat inspection machinery of the United States Bureau of Animal Industry in the Department of Agriculture would bring greater returns from the $3,000,000 annually appropriated, in being able to trace back the source of the tagged hogs that would be found to be tuberculous. But if the government or the farmers would not purchase the tags, it would be profitable for the packers to manufacture or purchase the tags and offer them for distribution to the farmers free upon application. For it must seem reasonable to you to suppose that, if the packers cannot possibly secure buyers or other persons at any price or salary, sufficiently expert to detect or even suspect the 430,177 tuberculous hogs and the 29,835 tuberculous cattle that were unconsciously purchased in 1907 at full market values among the 31,815,900 live hogs and 7,621,717 cattle; the packer would want to coöperate in every way with the farmers and the government toward eradicating the disease.

In conclusion, let us take a definite period of time, for instance. Last September the writer began and has since kept up, in spite of opposition, a vigorous educational propaganda in the agricultural press, advocating the tagging of all marketed live-stock as a means to the end desired, with the hope of getting the farmers, packers, government, and con-

sumer together for the purpose of economized and coöperative effort concentrated toward the eradication of animal tuberculosis. This method of locating infected farms was conceived by me in 1901, although it was not published until 1905.

If the tagging idea had been thoroughly understood and been supported, and if the farmers would have practised what they were convinced was right, and every animal going to market since last September had been tagged, the tuberculous hogs discovered by inspectors would have located practically every farm in this country that has or had tuberculous animals upon it. And upon a large number of these farms the owners would have, for the first time, been brought face to face with the incontestable and tangible, but heretofore unsuspected and unrealized, fact that they needed to do something, and the tuberculin test would then have been conducted.

La Marca Obligatoria de los Animales Tuberculosos como un Medio para Indicar los peligros en la Alimentacion y facilitar la eliminación de éstos.—(ROGERS.)

Animales peligrosos con focos de tuberculosis en los pulmones arrojan por medio de la tos los productos tuberculosis á la boca, debido al imperfecto desarrollo psicológico y físico del animal el acto de la expectoracion no es perfecto y los productos de esta son tragados y pasan al aparato digestivo. Mientras que algunos son absorbidos, la mayor parte son descargados con los excrementos, y he aqui el principio del peligro de los animales tuberculosos. Como termino medio 35,000,000 de bacilos por cada día se han encontrado en los excrementos.

El acarreo de animales sanos y la preparacion de los productos de la lecheria en tales lugares ha sido olvidado y no se ha reconocido como un factor en la tuberculosis. Las particulas del estiercol llegan á formar parte del polvo de la atmosfera que se deposita en la leche. Las vacas se ensucian las ubres, el abdomen, la cola, etc. y como consecuencia el bacilo cae sobre la leche durante el ordeño.

Los cerdos al alimentarse del estiercol adquieren un grado de tuberculosis en proporcion á la virulencia del bacilo en los excrementos. La inspección de 31,815,900 cerdos en 1907, demostró la infección de tuberculosis en 430,177. La infección predomina especialmente en los cerdos que estan en contacto con estos establos infectados.

Una marca de metal en la oreja dando la dirección del dueño facilitaría conciderablemente la automatica localizacion de las vacas tuberculosas.

Etiquettage Obligatoire comme Moyen de tracer automatiquement les Animaux tuberculeux dangereux et d'obtenir leur Eradication d'une Manière économique.—(ROGERS.)

Les bovidés dangereux, avec tuberculose *ouverte*, en toussant font passer les organismes de leurs poumons dans la bouche, et leur bas développement psychologique et physique les empêche de compléter l'acte d'expectoration par le crachement, de sorte qu'ils les avalent au lieu de les cracher. Quelques-uns sont absorbés, mais la majorité passe avec les excréments, et c'est là que commence le danger résultant des animaux tuberculeux; en effet on a trouvé une moyenne quotidienne de 35,000,000 de bacilles tuberculeux dans les excréments d'un animal.

L'action de préparer et d'obtenir des produits de laiterie, ainsi que la présence constante d'animaux sains dans un pareil environnement, est un facteur productif de tuberculose jusqu'ici méconnu et ignoré. Des parties minuscules de ce fumier forment part de la poussière des étables, qui tombe dans les seaux à lait chaque jour. Les vaches souillent leurs mamelles, leurs jambes et leurs queues en se couchant dans ce femier, et font tomber cette souillure en différentes quantités dans les seaux à lait ouverts, pendant le trayage.

Les cochons fouillent dans ces excréments, en mangent, et contractent un degré de tuberculose proportionnel au nombre de bacilles virulents qui se trouvent dans les excréments. Des 31,815,900 cochons inspectés en 1907, 430,177 étaient tuberculeux, la majorité ayant contracté la maladie en suivant le bétail tuberculeux dangereux.

Des plaques ou étiquettes en métal, fixées aux oreilles et indiquant l'adresse du premier propriétaire de tous les cochons vendus, traceraient automatiquement les vaches tuberculeuses dangereuses.

Zwangsweise Kennzeichnung als ein Mittel um gefährlich tuberkulöse Futtertiere automatisch einzuschränken und ihre Ausbreitung hinanzuhalten.—(ROGERS.)

Gefährliche Rinder mit offener Tuberkulose husten die Organismen von der Lunge in den Mund, und ihre niedere psychologische und physische Entwicklung verhindert sie, den Expectorationsakt durch Ausspucken zu vollenden; anstatt dessen verschlucken sie dieselben. Ein Teil davon wird absorbirt, die grösste Anzahl geht mit den Faeces heraus; hier beginnt die Gefährlichkeit der tuberkulösen Tiere, da ein täglicher Durchschnitt von 35,000,000 Tuberkelbazillen in den Faeces eines Tieres gefunden wurde.

Die Gewinnung und Bereitung von Meiereiproducten und die constante Anwesenheit von gesunden Tieren in solch einer Umgebung ist ein bisher

nicht anerkannter und übersehener Factor um Tuberkulose zu verursachen. Teilchen von solchem Stallmiste bilden einen Teil des Stallstaubes, der täglich in die offenen Milchgefässe fällt. Die Kühe beschmutzen ihre Euter, Körper und Schwänze durch das Liegen in solchem Miste, und zur Melkzeit fällt er in wechselnden Mengen in die offenen Milchgefässe.

Schweine beschnüffeln und fressen solche Faeces und acquiriren einen Grad von Tuberkulose der proportional ist zu der Anzahl der virulenten Tuberkelbazillen in den Faeces. Unter den 31,815,900 Schweinen, die im Jahre 1907 inspicirt wurden, waren 430,177 tuberkulös; die Mehrzahl davon hatte die Krankheit dadurch erhalten, dass sie solch gefährlich tuberkulösen Rindern gefolgt war.

Metallene Ohrenzeichen, die die Adresse des ursprünglichen Eigentümers aller verkauften Schweine zeigen, würden automatisch gefährlich tuberkulöse Kühe lokalisiren.

DISCUSSION.

Dr. Peters (Nebraska): The antagonism of the farmers to the adoption of satisfactory measures for controlling this disease must be overcome by proper education of the interested farmers. This should play a most important part in the campaign against tuberculosis. Instances are known where loads of cattle have been shipped into the stockyards which were known to be affected with tuberculosis, yet they have not been offered for sale subject to post-mortem examination unless compelled to do so by the State authorities. The presence of the disease in certain localities can be established by an identification system, and any data which can be obtained concerning the presence of the disease on certain farms is of great value in securing funds through State legislatures for the control of tuberculosis. I believe that eventually the tagging system in some form will bring satisfactory results. I believe sooner or later that this identification method will be practicable, and that the various States will take it up. It is one of the commercial problems for us to take up. In my work in Nebraska in coöperation with the Federal Bureau of Animal Industry we located many centers of infection. I can heartily commend this identification method to you, and I am sure it will always be found to bring good results.

Dr. Reynolds: I would like to have Mr. Ferguson given the privilege of the floor in order to tell us what he thinks of this identification method, and also as to its feasibility on a large scale.

Mr. Ferguson (Chicago): This question is of great importance to the packers, but unless you can get the government bureau, the larger commission men and all of the shippers in line you cannot locate centers of infection.

The present identification method is not practicable. Wherever it is applicable, identification can be secured, and the packers are ready at any time to assist the State officials in their efforts to locate the trouble. It is too bad that the matter has been allowed to remain without some effort to remedy it. Unless you can get the commission men to keep a correct record of the cattle handled by them and supply the information to the officials, you will not have much success. These commission men are opposed to the method, and their coöperation is hard to obtain, and unless you can get back to the original farm where the infected stock is found, you will not have much success in cleaning up tuberculosis. This cannot be accomplished without having some method of tracing the animals to the farms from which they come.

Dr. Rutherford: This is a subject in which I am taking great interest. We have had some experience in Canada along the same lines. We found that as soon as we began our meat inspection we had to condemn a large number of tuberculous animals, and there was a great deal of agitation immediately. I found that when we condemned 12 or 15 hogs for a farmer, he was going to look into the matter. I think we can with our efforts probably do something in the way of identification. We already have a system in operation by which our inspectors furnish a certificate to the packer in cases where the animals have been condemned. This certificate is taken back and the money is refunded by the original producer. This question hinges on some definite, legal, effective way of dealing with tuberculous animals on the farms. What is the use of tracing the disease to the farm unless you have some law on which to act? Under existing conditions I want to know what is the use of tracing it up unless you have a legal way of dealing with tuberculosis on the farm.

Dr. Nelson: I have been trying to carry out in the western part of my State the voluntary coöperation of the small butchers in asking them to report to me the source of the diseased animals which he encounters, and even in this small way I have had good results.

Dr. Rogers: I believe that with the aid of a tag which would remain on the hog after going through the scraping machine, the identification of the animal could be accomplished without much difficulty, and this would serve to trace the animal to the infected farm.

SECTION VII.

Tuberculosis of Animals and Its Relations to Man (*Continued*).

SEVENTH SESSION.

Friday, October 2, 1908.

THE CONTROL OF TUBERCULOSIS IN ANIMALS.

Section VII of the International Congress on Tuberculosis was called to order by the president, Dr. Leonard Pearson, at half-past nine o'clock, on Friday morning, October 2, 1908.

MEASURES AGAINST ANIMAL TUBERCULOSIS IN DENMARK.

By Bernhard Bang, M.D.,
Professor of Pathology and Therapeutics, Royal Veterinary School, Copenhagen.
Delegate of the Danish Government.

Measures against tuberculosis among domestic animals were first taken by the State by act of April 14, 1893, relating to the prevention of infectious diseases among domestic animals. According to sec. 11 of this act cattle-owners are prohibited:

(*a*) From sending animals (cattle and pigs) that obviously suffer from tuberculosis, to fairs and cattle-shows, to common pastures, stables, etc., of other cattle-owners, as well as from selling such animals, except for slaughter;

(*b*) From selling or using as human food animals or any part of an animal, obviously suffering from tuberculosis, unless a veterinary surgeon's certifi-

cate be produced stating that a previous examination of the carcass and the entrails has shown the meat to be fit for human consumption;

(*c*) From selling the milk of cows suffering from tuberculosis of the udder or using it as human food or in the preparation of food or as food for animals, except when boiled.

These measures have, however, produced few practical results. It is true that a number of animals have been rejected when presented for admittance at fairs and common pastures or for exportation, and no doubt the sale of such animals for other than killing purposes has now and then been prevented; still, it is difficult to impose fines in such cases, the term "obviously tuberculous" being too vague. Paragraphs *b* and *c* were amended later so as to provide more fully for the cases mentioned in them.

By the act of April 14, 1893, relating to State help toward the combating of tuberculosis among cattle, an attempt was made to encourage cattle-farmers to take measures to get rid of tuberculosis among their stock. By this act a sum of 50,000 kr.* yearly (afterward increased to 100,000 kr.) was, for a term of five years, placed at the disposal of the Ministry of Agriculture to pay for gratis distribution of tuberculin, for the injection of this substance by veterinary surgeons, for measuring the temperature of the animals, and for giving directions as to isolation, if the farmer in question wished to apply the tuberculin test to ascertain which of his animals were infected with tuberculosis, but only on condition of his binding himself to keep the healthy animals safely isolated from those suffering from tuberculosis.

As the primary object of these measures was to promote the breeding of healthy young cattle, at first only young animals were tested gratis; soon, however, the test was also applied gratis in the case of full-grown animals, and gradually it became quite common to subject the whole stock of a farm to the tuberculin-test in order to make it possible to isolate the healthy among the full-grown animals.

The passing of this act was chiefly due to a proposal of B. Bang, who for some years past had been studying the efficacy of tuberculin for proving the existence of tuberculosis among cattle and other domestic animals, and who had worked out a system for the extermination of tuberculosis in an infected stock by thorough isolation of the animals that were not yet attacked and by preventing the transmission of infection through raw milk.

According to Bang, tuberculosis is a purely contagious disease. It is true that infection may take place in the uterus so that the calf is born tuberculous, but this happens very rarely—practically only when the cow is highly tuberculous. Most calves are born healthy, even if born of somewhat tuberculous cows, and they will remain so if they are only preserved from infection. In the first place: tubercle bacilli are not ubiquitous.

* 1 kr. (krone) = 100 ø. (øre) = about 25 cents.

They are mostly found in stables, where tuberculous animals discharging tubercle bacilli are or have lately been stabled. Secondly: raw milk very often transmits infection, mostly, it is true, when the udder of the cow is attacked, but also frequently when this is not the case, partly because tubercle bacilli may be excreted through an apparently healthy udder, if the cow is highly tuberculous, partly because pure milk may be fouled by the introduction of tubercle bacilli through flux of the uterus or by particles of the feces of highly tuberculous cows.

The tuberculin tests proved that a great number of cattle of all the herds among which tuberculosis had long been prevalent were infected with this disease. Post-mortem examinations proved, however, that most of the reacting animals were only slightly affected; in many cases only small caseous-calcareous deposits were found in a few of the lymphatic glands, processes that no doubt often remain unchanged for years or are even sometimes cured.

According to Bang, therefore, there was no reason to kill milch-cows that did not show clinical signs of tuberculosis, but only reaction to tuberculin. So long as they were stabled in isolated stables, there was no reason why they should be killed or why their milk should not be used and calves bred from them, provided the latter were as soon as possible removed from the infected stable and were not infected by being fed on the raw milk of tuberculous animals. The highly tuberculous animals should not, of course, be allowed to form part of the stock, but should be killed as soon as possible—a measure which had certainly been taken rather often in former times, though not nearly as often as circumstances demanded.

It will be seen that these measures—devised by Bang and founded on the above facts—for combating tuberculosis among cattle interfered as little as possible with the breeding. He wanted farmers to remove from their stock only such animals as, from reasons of general economy, they would feel inclined to remove, *i. e.*, the animals that a merely clinical examination proved to be tuberculous. They were allowed to keep those that did not appear tuberculous until subjected to the tuberculin test, as long as they found they yielded sufficient milk, and to breed their calves, if only they took good care to keep the latter isolated from the perfectly healthy animals. If the isolation could not be carried out in any safer way (which would, of course, be preferable), a part of the stable might be partitioned off by a wooden partition, reaching from the ceiling to the floor. The common water-pipe would have to be cut off, or, if this was not practicable, it might be sufficient to let the water pass first through the part of the stable reserved for the healthy animals. If absolutely necessary, it would be permissible to have tight-fitting doors in the partition-wall; though this has certainly often proved a drawback, it being, of course, very difficult to keep such doors shut when not in actual use. Whenever it is at all possible, as it would be in the case of a

large stock, there ought to be two sets of stable hands—one for the healthy animals, one for the infected ones. If this was not possible, the servants would have to tend and milk the healthy animals first and have two sets of boots or shoes and overalls, as well as of implements, one for each class of animal. In the pastures the two divisions would also have to be kept apart as much as possible, though the danger is considered to be less when the animals are grazing than when they are in the stable.

As from the very outset it was quite clear to Bang that isolation of the animals on the same farm, especially if such had to be effected in one building by means of a partition-wall, could not be a complete guarantee against the introduction of contagious matter among the healthy animals, and that the tuberculin test was not in every case quite infallible (for instance, the animals might have been infected just before the test and so be unable to react), he directed that the healthy division was to be subjected to the tuberculin test once—or preferably twice—a year, so that those animals which, in spite of the isolation, proved to be infected, might be removed without delay from the healthy division to the reacting one, his object being the gradual purification of an infected stock during the course of several years. It would thus become possible for a farmer possessing a stock in itself valuable, though infected with tuberculosis, to gradually convert it into a healthy one by breeding from his own stock.

As early as 1892 Bang was enabled by a special government grant to demonstrate the practicability of his theories by gradually changing a highly tuberculous stock into a healthy one. The farm of Thurebylille was selected for this experiment. On the first application of the test 131 animals reacted, while only 77, mostly young animals, were found to be healthy. Of the milch-cows, 80 per cent. reacted, and of the young cattle and calves, only 40 per cent. The isolation of the two classes, the reacting and the healthy ones, from each other was effected by partitioning off a part of the stable with a solid wooden partition, the shed occupied by the calves forming part of the healthy division. There were two sets of stable hands, one for each of the two divisions, which were, moreover, kept apart when grazing as well as in the stable.

The practicability of the plan was soon proved, as the calves which were born in the infected division of reacting parents were nearly all found to be healthy (very few being born tuberculous), and remained so, provided they were at once removed from the infected stable and fed on boiled milk, their mother's milk (raw) only being given to them on the first day.

Still, as had been expected, year by year some of the animals of the healthy division did not pass the half-yearly test; in other words, some infection was introduced into the healthy division in spite of the isolation. Generally, it was only one or a few per cent. that did not pass the test; on a few occasions,

however, it was as much as 9 per cent. It will thus be seen that the elimination of the infection proceeded rather slowly, but then circumstances were rather unfavorable, because the isolation was not a thorough one, the daily control less effective than might have been desired, and, lastly, because the farmer was not sufficiently alive to the importance of removing highly tuberculous animals, discharging great quantities of bacilli, from the reacting division.

In spite of these drawbacks the healthy division increased year by year, and at last the task of eliminating the disease was successfully accomplished by selling the remainder of the reacting division—about 30 head of cattle. The farm is now one of those that supply Copenhagen with "milk for infants" (*i. e.*, superior milk); the stock is every year subjected to the tuberculin test, and the last time, in 1907, not one out of 211 animals reacted.

As the act of 1893 provided generous assistance to such cattle-farmers as were anxious to improve the sanitary condition of their stock by employing the method which had been tried at Thurebylille, a great number of both small and large farmers set to work, in many cases with excellent results. At all large farms, however, where tuberculosis is generally very prevalent, the elimination of infection progressed slowly, just as had been the case at Thurebylille, a few of the animals of the healthy division reacting whenever they were subjected to the test a second time. The stricter the isolation, the better the results, the best results being, of course, achieved, when it was possible to remove the healthy animals to another farm. The thorough disinfection of stables where highly tuberculous animals had been stabled, in order to destroy all contagious matter, often proved a very difficult task, especially in buildings where the woodwork and the stone floors were old and dilapidated. Where tuberculosis was not very prevalent, as was very often the case among small herds, and sometimes even among large ones (in one case, for instance, only 6 animals out of 134 reacted), it was, of course, easy enough to root out the infection completely.

By means of the numerous tuberculin tests which—especially during the first few years after the introduction of Bang's method—were applied to cattle in all parts of Denmark, much valuable information was obtained as to the extent of tuberculosis in Denmark, closely corresponding with the results obtained in all other countries where tuberculin was largely used. In many herds the disease was very prevalent. Among large herds (*i. e.*, herds numbering 50 or more animals), only few proved to be quite free from tuberculosis. Among stocks of this size the average number of reacting animals was 50 or 60 per cent., while among small herds (numbering less than 50 animals) a great number, about one-fourth, were perfectly healthy, and the number of reacting animals in infected "small" stocks was considerably less than that of the large ones—hardly 30 per cent.

The fact that a great many small stocks consist of none but healthy animals (in 1898 there were 2203 stocks, numbering 30,101 animals; on an average, 14 in each) clearly shows that the opinion, prevalent among many medical men, that tubercle bacilli are ubiquitous, is fallacious. They are never found except in places where animals (or human beings) discharging tubercle bacilli live or have lately lived. Tuberculosis is a purely contagious disease.

This view is strikingly confirmed by a closer examination of herds among which tuberculosis is found. Only such herds are perfectly healthy as are kept up by breeding, receiving hardly any increase from outside, except a calf now and then, while the prevalence of tuberculosis is generally the greater the more frequently the stock is increased by buying cattle at fairs, and consequently the most infected parts of the country are those where a brisk trade in cattle is being done and where buying and selling of cattle is common.

Another way by which infection may be introduced among hitherto healthy stocks is by feeding calves on skimmed milk from a coöperative dairy, among whose suppliers will always be found owners of tuberculous cattle. In cases where the infection had been introduced through the milk, the cows were very often healthy, while it was the calves or the young cattle that reacted; sometimes the peculiar fact might be observed that only animals of the same age—for instance, yearlings or two-year-olds—reacted; and when this happened, the heating apparatus of the dairy was found to have been out of order just at the time when milk was supplied to the set of animals that had reacted.

In all other cases the tuberculin test proved conclusively that tuberculosis is more prevalent among old than among young cattle. A close examination of 40,624 head of cattle, which during the years of 1898–1904 were subjected to the tuberculin test for the first time, showed that of calves under six months, 12.1 per cent. reacted; of yearlings (from six to eighteen months), 27.5 per cent.; of two-year-olds (from one and one-half to two and one-half), 38.6 per cent.; of full-grown animals (from two and one-half to five), 44.9 per cent.; and of animals over five years old, 48 per cent.—figures which correspond with the results of tuberculin tests in other countries, as well as with the experiences of slaughter-houses and with the results of the study of human tuberculosis.

The method, recommended by Bang, for enabling cattle-farmers to combat tuberculosis by their own efforts, *i. e.*, strict isolation of the healthy animals and feeding calves on uninfected milk (milk of perfectly healthy animals or milk heated to 85° C.—now only 80° C.), had at first many enthusiastic followers, as will be seen by the following table:

	Stocks.		Number of Animals Tested.		Percentage of Reacting Animals.
	Total Number.	Number of Stocks Tested the First Time.	Total Number.	Of These Reacted.	
April, 1893–June, 1894....	327	327	8,401	3,362	40.0
June, 1894–October, 1895 .	1,873	1,645	44,902	17,303	38.5
October, 1895–May, 1896 .	930	749	20,791	6,622	31.9
May, 1896–June, 1897...	7,316	3,012	84,897	21,668	25.5
June, 1897–May, 1898...		2,165	65,788	15,642	23.8
May, 1898–Jan., 1899.....	1,454	618	35,533	7,725	21.7
1899.....	1,293	543	33,568	6,759	20.1
1900.....	1,101	417	26,078	4,976	18.0
1901.....	695	259	18,818	2,857	15.2
1902.....	895	396	23,347	3,531	15.1
1903.....	646	213	19,364	2,875	14.8
1904.....	738	277	23,164	3,750	16.2
1905.....	705	221	24,161	3,370	13.9
1906.....	689	294	25,035	3,398	13.6
1907.....	580	232	22,982	2,252	9.8

After a few years, however, there was a sad falling-off. The carrying out of the above measures demands great vigilance and perseverance on the part of farmers as well as on that of their servants, qualities not often met with. The importance of strict isolation was not at first fully realized by all, the watchfulness was often relaxed, the disinfection of the stables was not always as thorough as it should have been, the milk was not always sufficiently heated. Many farmers thought the method too troublesome in the long run. If accidents happened, so that too many animals of the healthy division reacted on the repetition of the test, the farmer would lose courage and listen to the many voices (especially those of butchers and cattle-dealers) eager to assure him that the tuberculin test was mere humbug. The serious misuse of tuberculin in employing it for the immunization of cattle intended for export to Germany for killing purposes—these animals, according to the peculiar German regulations, are to be subjected to the tuberculin test in passing quarantine at the German frontier—contributed greatly to the dissemination of wrong ideas among the public. The well-known and unfortunate circumstance that highly tuberculous and consequently infectious animals sometimes do not react at all, or only very slightly, must also be taken into account, veterinary surgeons sometimes neglecting to subject the non-reacting animals to a sufficiently careful clinical examination, so that it sometimes happened that a specially infectious animal was placed among the healthy ones.

However, although there was a great falling-off, many farmers have persevered, and most of them—both owners of large and of small stocks—have

obtained excellent results. For instance, on the first application of the test in 1894 at the farm of Borupgaard in Jutland, 139 out of the total number (82 per cent. of the full-grown animals) reacted, and only 86 were found to be healthy. When the test was applied at the same farm in 1908, out of 245 animals only one calf reacted, and so slightly that the reaction must be considered doubtful. This excellent result had been attained by strict isolation (division of the large stable by a wooden partition and separate stables for calves and young cattle). According to the careful calculations of the owner of the farm, the total expense of the isolation was about 1000 kr.

When the test was first applied in 1896 at Count Wedell's estate, Wedellsborg (Funen), 166 of the animals reacted and only 74 were found to be healthy. Now there is a stock of 264 head of cattle, of which only 3 reacted in 1908. In this case the division of the stable had been effected by means of a brick wall. Although during the first few years a very small percentage of the animals did not pass the half-yearly tests, the result was now and then rather bad, as when, on one occasion, as many as 22 per cent. reacted, which discouraged the owner of the estate so much that he very nearly gave up the whole thing. Fortunately, however, he persevered, and eventually reaped the reward of his exertions.

A well-known cattle-breeder—Mr. Ahlmann, of Langholt and Striben (Jutland)—had, in 1895, 271 reacting and 68 healthy animals. At present the reacting division has been reduced to 10, while of the remaining stock on his two farms, only 6 out of 373 animals reacted at the last test. Mr. E. Tutein, of Edelgave (Sealand), had in 1895 115 reacting animals and 48 healthy ones; the last time the test was applied, only 2 out of 158 reacted. As early as 1899 Bang, in the report submitted by him to the veterinary congress of Baden-Baden,* expressed his opinion that the best way to root out tuberculosis in a large stock among which the disease had long been prevalent would be to subject at first only calves and young cattle, and none of the full-grown animals, to the test, as experience had shown that among such a stock 80 per cent. or more of the full-grown animals would react. Consequently only very little would be gained by isolating the 10 or 20 per cent. of non-reacting cows, as a great number of these animals, having for a long time been exposed to infection, would turn out to be infected, even if they did not react. Not a few of such cows will be found to have in some of the lymphatic glands small tubercles of long standing, encysted, it is true, and consequently harmless, but still in some cases liable to break out again. By not subjecting the full-grown animals of their stock to the test, farmers would avoid the unpleasantness of learning (and of having to tell their friends!) that the greater part of their stock was infected, and the task of isolation would be the easier at first.

* Congress Report, vol. i, p. 541.

It is really beyond comprehension that every great cattle-farmer who is the owner of a valuable herd, and knows it to be infected, does not take the simple precaution of isolating his calves from the full-grown animals of his stock and feeding them on uninfected milk, *i. e.*, milk that is sufficiently heated or milk from a few perfectly healthy (non-reacting and clinically examined) cows. In countries where the "artificial" feeding which is common in Denmark is unknown, a way out of the difficulty would be to make some perfectly healthy cows act as wet-nurses and suckle the calves. Indeed, as has been proved by the Hungarian Ujhelyi, good results may be achieved even if the mothers are allowed to nourish their own calves, provided the calves are kept in separate stables, except when they are let in to their mother for feeding two or three times a day. This breaking away from the isolation rule involves, of course, some danger of infection; there is, however, a great difference between such a brief exposure to infection and constant cohabitation in the same stable day and night.

Of course, the isolated calves should be subjected to half-yearly tuberculin tests, so that the infected ones may be removed as soon as possible, and the healthy stock which is being formed by the above measures should, of course, be kept continually apart from the old infected stock. The Ostertag method of keeping the healthy animals isolated only as long as they are young, and later stabling them together with the full-grown cattle, cannot by any means be recommended, as the infected stock, even though its sanitary condition may be improved by removing the most infectious animals by means of a careful clinical control, will never be so completely rid of animals that may transmit infection as to obviate further danger. This cannot be attained by the clinical control alone.

For great landed proprietors, owners of several farms, it will be an easy matter to get rid of tuberculosis by sending all the healthy animals of their stock to one of their farms, and gradually—by means of the above method—eliminating the infection from the herds of their other farms. The following account of how matters were managed at the farm of Ourupgaard and three other farms at Falster, belonging to Mr. Fr. Tesdorpf, may serve as an instance to show how infection may be rooted out in this easy and cheap way. Here a beginning was made in 1893 by subjecting calves and young cattle of the stock of Ourupgaard, but no full-grown animals, to the tuberculin test, with the result that 31 reacted, while 152 were found to be healthy. The healthy animals were strictly isolated first at Ourupgaard, in separate stables; later at two of the other farms. During the succeeding years the testing of this healthy stock of young animals, as also of the calves that were born, was continued. At first the result here, as at many other farms, was sometimes rather unsatisfactory; for instance, in 1896, when 23 animals out of 361 reacted; but in time, as the isolation was carried out more and more

carefully, better results were obtained, until last year, when at the four farms belonging to Mr. Tesdorpf, only 11 animals out of 876 reacted. At one of the farms there is still a herd of 114 reacting (or non-tested) animals.

Just as good results have been obtained by Count Danneskjold-Samsoe at his three large farms in the island of Samso. Here, as early as in 1891, a beginning was made by testing the calves, of which relatively few reacted. The reacting animals were killed, and the healthy calves and young cattle were kept isolated for some time, only, however, until the beginning of the calving season—which was certainly a great mistake (one that could not be prevented, the test being a private one). They were then placed in the large, well-appointed stable, together with the non-tested cows, which, though apparently healthy, infected the others, so that when at length Bang, in 1898, prevailed upon Count Danneskjold-Samsoe to have the whole stock, which during six or seven years had been continually recruited with absolutely healthy young animals, subjected to the test, 286 animals reacted, while only 29 were found to be healthy! From that time the healthy animals were kept isolated at two of the other farms. In 1901 there were at one of these farms 208 animals, which all passed the test, and at another 126, 4 of which reacted. In December, 1907, there were in the healthy divisions 593 animals, of which 2 reacted, though doubtfully, on being subjected to the test. In addition, there was still at one of the farms a reacting division of about 30 cows. So the great task of changing a large tuberculous stock into an all but healthy one by breeding had been accomplished in ten years—an excellent result, indeed!

Excellent results may also be obtained by isolation at one farm, as will be seen by the two following instances: In 1896 Farmer Langermann of Faurholm had 45 calves subjected to the test, 15 of which reacted. From that time until now the calves bred at the farm have been tested and kept isolated, while the full-grown animals of the stock were not tested at first. That they were highly tuberculous was proved by the fact that 19 of the apparently healthiest cows reacted on their being subjected, in 1900, to the test as an experiment. Gradually a perfectly healthy stock has been bred, numbering—in April, 1908—197 animals, none of which reacted when tested.

At the large estate of Voergaard in Jutland (belonging to Mr. Scavenius) the same method of leaving the full-grown animals untested at first was adopted. In 1895, 94 yearlings and two-year-olds were tested, half of which reacted. The result of continued isolation of the calves and the young cattle and repeated tuberculin tests (of the calves twice yearly, of the older animals only once) is that there were in 1907 healthy divisions numbering 443 animals, of which only 9 reacted upon the application of the test, and a reacting division of 41 animals. The manager of the cattle-farm was much struck by the gratifying fact that the cows live much longer now than at the time

when tuberculosis was prevalent among them—a fact that is, of course, of the greatest importance as regards the profits of cattle-farming, and which is generally taken too little into account.

It is by no means only at the large farms that excellent results have been obtained by the method of isolation. It is, indeed, quite possible to carry it out at the small farms as well. The difficulty at these farms is, of course, to find two sets of stable hands to tend and milk the two divisions, but, on the other hand, there is the advantage that at a small farm nothing escapes notice, and that the farmer can personally see to the execution of his orders. A small farmer, if he has only intelligence enough to grasp the main point, can, much more easily than a great land-owner, take care that the transmission of infection is avoided. Generally it will not be necessary to have two sets of stable hands, if only the rule of tending and milking the healthy division first is strictly adhered to, and if the hands change their boots or shoes, and, preferably, their overalls as well, on going from one division to another, and use different sets of implements in the two divisions.

It is a fact that the carrying out of the method of isolation has been attended with excellent results on many small farms. Where only few animals reacted, it was easy enough to get rid of the disease; but also in cases where almost the whole stock was infected, the gradual elimination was often successfully accomplished. It may here be mentioned that it repays one's trouble to work for small farmers—men who have felt their economic existence threatened by the prevalence of tuberculosis among their cattle. These men are deeply impressed with the importance of getting rid of the disease and so take more care, in performing their daily duties, to avoid the transmission of infection than do most others.

The result of a computation made by Bang in 1905 was that at 66 small farms, of which the average number of stock was 29 head of cattle, a gradual changing of what were for the most part highly tuberculous herds into healthy ones had been successfully accomplished by the method of isolation. When this work was begun, the total number of reacting animals on these 66 farms was 1045, and of healthy ones, 780; when it was finished, there were 1896 healthy animals, and none reacting. On being asked, several of these farmers told Mr. Bang that the work had certainly caused a good deal of trouble, but that the expense was nothing to speak of. Thus one farmer had, by spending a sum of less than 200 kr. on the establishment of two small provisional byres in one of his farmhouses, succeeded in changing his highly tuberculous stock (12 cows and heifers of which he had had to sell for a mere song within a few years) into a perfectly healthy one, numbering 30 head of cattle,—in 1907 there were 36,—which have been several times subjected to the tuberculin test and have each time been found to be healthy. Other farmers have achieved similar excellent results at still smaller cost.

It will thus be seen that there is not the slightest doubt that both small and large cattle-farmers may gradually change a tuberculous stock into a healthy one, if they are determined to do it, and if they have quite grasped the nature and the modes of infection of tuberculosis.

N. O. Nielsen, veterinary surgeon (Remkolde near Vordingborg, Sealand), has had the good idea to persuade a great number of the small cattle-farmers of his district to join an association, with the object of "promoting the breeding and maintenance of healthy, non-tuberculous stocks of cattle and pigs." Only such farmers are allowed to join as have had their stock subjected to the tuberculin test, and, in case of its proving only partially healthy, have suitably isolated the healthy animals from the diseased ones. No increase of the stock by animals of other stock, except calves under one month, is allowed, unless they come from a healthy stock and have been found healthy on being infected with tuberculin. The object of the association is, besides setting a good example, to facilitate the purchase of healthy animals, as members who want to buy or sell may apply for advice to one among them who keeps a list of the farms where healthy animals are for sale. To some of the members is delegated the task of superintending the heating of milk at the dairies. Members pay a subscription of 2 kr. yearly.

The association was started in December, 1905, and has prospered so much that it has now 125 members possessing stock amounting to 2740 cows and young cattle. (According to a report, dated January 1, 1908, 2070 of the 2442 animals of the association were healthy, and only 14 of the members had reacting (isolated) animals—372 in all.) Within three years the task of rooting out tuberculosis from 25 stocks of cattle has been accomplished by means of killing or selling the reacting animals. (On the first application of the test 85 stocks—most of them very small, it is true—were found to be healthy.) More than half of the cattle of the 4 parishes—the scene of the labors of the association—belong to members. There is no doubt that such associations may do much toward rousing an interest in small farmers in the great problem: How to breed healthy cattle and pigs. "Union is strength" may be more truly said of Denmark, where so much is achieved by coöperative farming, than of any other country.

The growing interest in the rational application of the tuberculin test and the method of isolation has, in addition to the founding of the above association, manifested itself lately in another way.

During the last seven or eight years several thousand head of Jersey cattle have been imported into Denmark direct from the island of Jersey. These cattle, as well as all other cattle that are imported for breeding purposes, must undergo a brief quarantine detention and are subjected to the tuberculin test (in accordance with the act of February 5, 1904, relating to the combating of tuberculosis among cattle and pigs). This has further corrob-

orated the truth of the already well-known fact that tuberculosis is all but unknown among the Jersey cattle—an interesting circumstance which is accounted for by the fact that the Jersey stock has been kept pure for more than one hundred years, the importing of cattle, except for immediate slaughter, being prohibited, probably to prevent the introduction of rinderpest. Of the Jersey cattle imported into Denmark, only very few animals reacted on being subjected to the test, and when these animals were killed, it was either quite impossible to demonstrate the presence of tuberculosis (accidental fever), or it was found to be present in a very slight degree only (perhaps caused through human infection?). On being placed among infected Danish cattle, healthy Jersey cows will very soon become tuberculous; sometimes even they have been known to give way to the disease quicker than Danish cattle. The man who first imported Jersey cattle, and who is the most eager advocate of the introduction of this excellent breed, which, owing to its wonderfully rich milk, is of special value to a butter-producing country, viz., Mr. J. Larsen (Gaardbogaard), was fortunately also a very eager advocate of the use of tuberculin, and has always taken good care to keep his stock free from tuberculosis. Consequently it has been easy for him to induce the majority of the cattle-farmers who import Jersey cattle to keep their newly imported animals free from the disease by means of isolation. There are at present about 5000 head of Jersey cattle in Denmark,—on small as well as on large farms,—most of which are either quite free from tuberculosis or successful efforts are being made to make them so. At many of these farms the stock is composed exclusively of Jersey cattle: at some the breed is mixed.

The foregoing is chiefly an account of what is being done in Denmark to combat tuberculosis among cattle by the cattle-farmers, assisted by the State, which pays the expenses attendant on the tuberculin tests on condition that the farmers bind themselves to keep their healthy animals safely isolated from the infected ones. In conclusion follows an account of the two measures with the same object (as passed by the Legislature):

The amendment in 1898 of the Tuberculosis Act of 1893 provides that all cows found suffering from tuberculosis of the udder are to be killed, and that a partial compensation is to be paid to the owner by the State; further, that all skimmed milk and buttermilk returned from dairies to be used as food for calves and pigs is previously to be heated to 85° C. In 1904 an amendment was added providing that the compensation for a cow killed on account of tuberculosis of the udder is to be increased a little, so as to represent one-third of the market value of the carcass, calculated at the current average price for meat of inferior quality if the meat is declared by a veterinary surgeon to be fit for human consumption (which happens very rarely), and five-sixths of the market value of the carcass if the meat is condemned. By an

amendment of the provision relating to the heating of the milk it was provided that the milk is now to be heated to 80° C. instead of to 85° C., and that this provision is also to apply to cream destined for the making of butter for exportation. The object of this latter provision, which has, of course, in itself nothing to do with the endeavors to combat the prevalence of tuberculosis among domestic animals in Denmark, is to keep Danish butter free from viable tubercle bacilli. It cannot be said to have revolutionized the dairy work to any great extent, as the heating of buttermilk has always been performed indirectly by heating the cream. Long before 1898 it was common enough to heat the cream very considerably in order to insure the perfect purity of the butter. There is no doubt that the usual heating of the cream and the adding of cultures of acidifying bacteria before the churning have contributed much to the practically invariably superior quality of Danish butter.

The object of the killing of cows suffering from tuberculosis of the udder is to get rid as soon as possible of these animals, through which, more than through any others, infection may be spread to calves, pigs, and other domestic animals, and also, undoubtedly, to human beings, especially children, if the milk is taken raw. The endeavors to combat tuberculosis of the udder have met with great sympathy among Danish farmers. About 2500 samples of milk of cows, suspected of suffering from this form of tuberculosis, are sent in yearly through veterinary surgeons to the laboratory of Dr. Bang, and the microscopical examination of these samples, either of the particles produced by exudation, or—in case of the milk being unchanged—of the sediment after centrifugation, showed tubercle bacilli to be present in about 30 per cent. of the cases. After the killing of the cow parts of the diseased udder are subjected to examination in order to ascertain the correctness of the diagnosis, which in only about 1 per cent. of the cases has turned out to be at fault. About 700 cows are killed every year, and the compensation paid for them generally amounts to 50,000 kr. yearly.

The object of the killing of cows suffering from tuberculosis of the udder is, of course, best attained if the case is established when still at an early stage. The fact is therefore worth mentioning that of the 6228 cows suffering from tuberculosis of the udder destroyed in Denmark in the course of ten years, 2149, or 34.5 per cent., were still at a very early stage of the disease, as the secretion of the diseased gland still had the appearance of natural or almost natural milk. In many other cases also the rooting out of these infectious animals has had great hygienic importance, as cows suffering from tuberculosis of the udder may often go on living for months after their milk has changed, and even though at this stage the milk is not generally mixed with uninfected milk, it still contributes to spread infection in the stable by being milked on the floor.

The compulsory slaughter of these animals is therefore indubitably justified, but much more ought to be done. The best thing would be to order all cows suffering from "open tuberculosis," *i. e.*, all which discharge tubercle bacilli through any of the excretory ducts, to be destroyed, and partial compensation granted to the owner. Should the authorities hesitate for the present from acting upon this recommendation,—partly because of the expense, partly because it may be rather difficult in some cases to decide whether a coughing cow is suffering from pulmonary tuberculosis, especially of an ulcerative, infectious form,—there is at any rate one form of tuberculosis which is extremely easy to diagnose, as the presence of the bacilli may be proved directly, viz., tuberculosis of the uterus. This disease, which seems to be even more frequent than tuberculosis of the udder, is most infectious; not only are enormous masses of tubercle bacilli every day spread in the stable through the discharge from the vagina, but a great number are no doubt mixed with the milk during the milking. It is six years since the veterinary authorities of Denmark recommended that the same action should be taken with regard to cows suffering from this disease as with cows suffering from tuberculosis of the udder, but up to the present day their advice has been disregarded.

The most important of all the measures against tuberculosis among cattle and pigs which have been carried out in Denmark is the law relating to the heating of skimmed milk and buttermilk to 80° C. before it is returned from the dairies. As in Denmark nearly all milk not sold directly for consumption is sent to coöperative dairies, it is clear that there is very great danger of a wide dissemination of tuberculosis if raw skimmed milk and buttermilk are returned to the suppliers to be used as food for calves and pigs. There will always among the suppliers of a dairy be one or more farmers who have a highly tuberculous stock, one or more cows of which yield in the course of the year great quantities of infected milk, and so, by employing this milk, after it has been skimmed, to feed other stocks, the infection is spread to hitherto healthy herds. As mentioned above, this was formerly done on a large scale, and there is no doubt that most stocks of cattle and pigs in Denmark would gradually be infected in this way if measures had not been taken to prevent it. Of course, the heating of the whey ought to have been enforced by law as well; this was proposed, but the proposal was not accepted, chiefly because the heating of the whey is rather troublesome. It is, however, to be hoped that this measure will be carried out some day, though, as whey is mostly used for feeding pigs, it is not so important as the other dairy products, as regards bovine tuberculosis, and, besides, cheese-making is not nearly so considerable in Denmark as butter-making.

In Denmark the observance of the law regulating the heating of skimmed milk is controlled by the police as well as by the margarine and butter in-

spectors, who procure samples at the dairies and send them to the laboratory of Prof. Storch, where they are subjected to his color test, which consists of pouring a few drops of paraphenylen-diamin and peroxid of hydrogen into the milk. The milk turns blue if it has not been heated to 80° C. Offenders against the act are fined. On the whole, the regulations governing the heating of milk are fairly scrupulously carried out, though, of course, there are exceptions. The best plan would be for one or two of the suppliers of each dairy to apply the above easy and simple test every day. This is done in some places and has produced very good results.

One useful provision of the Tuberculosis Act is that the sediment deposited on the sides of the cream-separator is to be burned, which is no doubt always done now. In old days this product was now and then used as food for pigs, and thus many pigs were infected, as it contains enormous masses of tubercle bacilli which are separated from the milk by the centrifugal force.

ACT OF FEBRUARY 5, 1904, CONTAINING MEASURES AGAINST TUBERCULOSIS AMONG CATTLE AND PIGS.

A sum of 100,000 kr. granted every year by the Rigsdag (Parliament) on the recommendation of the Committee of Ways and Means shall be placed at the disposal of the Minister of Agriculture for the support of cattle-farmers who wish to employ tuberculin as a diagnostic remedy in combating tuberculosis among their cattle, the tuberculin test being applied according to detailed regulations issued by the Minister. The support shall be granted to none but such farmers as guarantee their ability to keep the animals, proved by the test to be healthy, safely isolated from the animals affected by tuberculosis, or which have not been subjected to the tuberculin test.

The Minister of Agriculture shall—on the same conditions—be entitled to employ part of the sum to support cattle-breeding associations which wish to subject the animals selected for breeding purposes to the tuberculin test, as well as to support farmers' associations desiring to subject cows belonging to cottagers to the tuberculin test.

Farmers who do not fulfil their obligations with regard to isolation shall return to the State the grants which have been made to them in accordance with the above provisions.

Any veterinary surgeon superintending the application of the tuberculin test on a farm shall satisfy himself, under penalty of a fine, that safe isolation between the animals is established, and if his orders to this effect are not obeyed by the farmer, he shall notify this to the chief veterinary surgeon of the country.

Applications from cattle-farmers, cattle-breeding associations, and farmers' associations desiring to take advantage of the opportunity offered to them by this Act of having their cattle subjected to the tuberculin test shall be sent direct to the Minister of Agriculture.

Sec. 2.

Importation of live cattle from abroad shall only take place at such

places as are mentioned in the regulations issued by the Minister of Agriculture. Immediately after their arrival the animals shall be quarantined, and shall, in accordance with the regulations of the veterinary police, be subjected to the tuberculin test, according to regulations issued by the Minister of Agriculture, within five days after their arrival at the quarantine stable. After the test the non-reacting animals shall be left at the disposal of the owner, while the reacting animals shall either be returned or taken direct to a public slaughter-house or to a slaughter-house recognized by the Minister of Agriculture, where same shall be destroyed under control of the veterinary police.

The expenses incurred in providing the requisite quarantine stables at the places of import, as well as the expenses of the tuberculin tests, but none of the expenses attendant on the other measures mentioned in this section, shall be borne by the State.

The regulations relating to tuberculin tests, mentioned in sec. 1, shall also apply to such other diagnostic remedies as may be recommended by veterinary authorities for the combating of tuberculosis among cattle, and are approved by the Minister of Agriculture.

Sec. 3.

Animals imported for killing purposes may be exempted from quarantining and the tuberculin tests ordered in sec. 2.

Such animals shall, after having been branded (see sec. 4), be taken direct to a public slaughter-house or to a slaughter-house recognized by the Minister of Agriculture.

The Minister of Agriculture shall be entitled to permit cattle imported for killing purposes—after having been marked—being taken direct to a cattle-market, where the animals shall be stabled so as to be, in the opinion of the veterinary police, duly isolated from all other cattle. From this place they shall be taken direct to a public slaughter-house or to a slaughter-house recognized by the Minister of Agriculture.

The animals imported for killing purposes mentioned in this section shall be killed within ten days after their arrival in this country.

Sec. 4.

The Minister of Agriculture shall issue regulations for the marking of the imported animals.

Sec. 5.

Cows suffering from tuberculosis of the udder shall be killed, in accordance with the regulations of the State, under control of the veterinary police or in a public slaughter-house. The owner shall be entitled to a compensation for the animal, amounting to one-third of the market value of the carcass, calculated at the current price, according to regulations issued by the Minister of Agriculture. The owner shall further be entitled to a compensation for such parts of the animal as are declared by the veterinary surgeon to be unfit for human consumption, amounting to half of the value of the condemned meat, calculated as above. Such parts of the animal as are declared fit for human consumption shall be left at the disposal of the owner.

The compensation as well as the expenses attendant on the killing shall be paid by the State.

Sec. 6.

None but such milk and buttermilk as has been heated to a temperature of at least 64° Reaumur (80° C.) shall be returned from dairies to serve as food for cattle and pigs. Exceptions from this rule may take place when the heating cannot be performed on account of an accident, which fact shall be made known to the person to whom the milk is to be returned.

The heating mentioned in this section shall also apply to all cream destined for the making of butter for exportation.

The sediment scraped off the sides of the cream-separator during the cleaning of the same shall be burned.

Sec. 7.

None but such milk and buttermilk as has been sufficiently proved in the opinion of the Minister of Agriculture to have been heated to a temperature of at least 64° Reaumur (80° C.) shall be imported from abroad. The Minister of Agriculture shall, however, be entitled to grant exemption from the above prohibition when special circumstances necessitate it.

Sec. 8.

The carrying out of the provisions of this Act shall be enforced by the veterinary police, the custom-house officers, and the butter and margarine inspectors in accordance with the directions of the Minister of Agriculture.

Sec. 9.

Offenders against the provisions of sections 1, 2, 3, 6, and 7 shall be liable to fines of from 10 to 20 kr. for the first offense; in case of repetition, to fines of from 20 to 200 kr. Repeated offenses against sec. 6 shall not be looked upon as such if at least one year has elapsed since the offender was last fined. The fines shall accrue to the exchequer. The proceedings in these cases shall be summary. In the case mentioned in sec. 7 the prohibited articles shall be confiscated and heated to the temperature defined in the above section. In Copenhagen the proceeds of the sale of such articles shall accrue to the municipal fund; in other places, to the poor fund.

Sec. 10.

This Act, which shall not apply to the Faroë Islands, shall come into force October 1, 1904.

DISCUSSION.

MR. POPE: I think the latter part of this paper contains a very important suggestion for the American farmer. It would be much easier for the average American farmer to leave his old herd and start a new one. This seems to be more workable than testing the cattle and then weeding out the reactors. The danger is, of course, in leaving the old infected animals in the herd. This phase of the question, which Professor Bang has brought out, should be very impressive for the Americans, although the climatic conditions are very different in the United States.

DR. DEERING: I would like to ask Professor Bang if his government compensates the farmers for cattle that are slaughtered.

PROF. BANG: Only for those affected with udder tuberculosis. We pay about $20 per head for animals that are destroyed. We pay according to the work and meat value and the market price, which brings the amount to about $20 a head.

DR. PEARSON: In the way of explanation for Professor Bang, I would like to state that Maine has a very low percentage of tuberculosis, and that the disease has been almost eradicated from that State.

DR. RUTHERFORD: It appears that the gentleman from New York and Professor Bang are looking at the matter from two points of view. It is a problem which has not yet been fully solved. Professor Bang has perhaps come as near as any one else to solving it. There seems to be a confusion of ideas as to the province of a veterinarian in relation to health officers. The health officers are medical men. They are anxious to prevent tuberculosis, and it is their duty to see that no milk affected with tubercle bacilli is furnished for consumption. If legislation is obtained by a State enabling a municipality to forbid absolutely the supplying of milk for human consumption from tuberculous cows, then it is the duty of the health officer to enforce this law through the veterinarian. If it is necessary to separate the calves from their dams and to heat the milk to 80° C., does Professor Bang not think there is some responsibility in allowing children and human beings to drink that milk without that precaution? Another point: if butter is made in Denmark from heated cream, is it all right? These things are not done in this country. The proposition is made that all by-products should be sterilized before being allowed to go out from the farm. I do not think that Professor Bang should permit people to consume milk which he will not permit to be fed to calves. I would like to ask him whether or not he has seen any serious results from tubercular infection of the supramammary gland as well as the udder itself.

PROF. BANG: I cannot say with certainty that I have seen any infection from tuberculosis of the supramammary gland. There may be present tuberculosis of this gland without it appearing in the udder. I am sure about using milk for children—only by accident. Investigators claim that bacilli will not exist in the milk if the cows have no clinical symptoms. I made many experiments with milk of highly tuberculous cows with hardened udders, and I found in only 14 per cent. of such cases that the milk contained tubercle bacilli, by the injection of guinea-pigs. Therefore I think there is no danger from the milk if the cow shows no clinical symptoms of the disease. In our country milk is prohibited from being sold for consumption by children unless it comes from an absolutely clean herd.

THE CONTROL OF BOVINE TUBERCULOSIS.

By Dr. J. G. Rutherford,
Ottawa, Canada.

It would be most unbecoming in me, following the various distinguished speakers who have taken part in the discussions of this Congress, and especially at this late date in the proceedings, to occupy any great length of time in laying before its members the few ideas on the control of bovine tuberculosis which I have been able to put together in the limited period at my disposal. I observe that on the official program the subject assigned to me is the "Control of Bovine Tuberculosis in Canada," the last two words having been added to the title originally sent in by me. I have but little to say on the control of bovine tuberculosis in Canada, inasmuch as while in some districts, under municipal and provincial laws, efforts are being made to control the disease in dairy herds supplying various centers of population, very little is now being done by the Federal government through the Health of Animals Branch of the Department of Agriculture, which is in my charge.

Although for some years, at a period prior to my assuming office, a very considerable amount of testing with tuberculin upon the application of owners was carried on, no appreciable benefit was found to result, and, as a matter of fact, we now confine ourselves to the testing of cattle imported or exported for breeding purposes, those on the experimental farms, and a few other herds which have been placed by their owners under the direct control of our officers. We, however, on the request of owners of cattle who desire them tested, supply tuberculin free of charge to any reputable, qualified veterinary surgeon, on condition that he will send to the Department the results of the tests made by him, on charts which we furnish for that purpose.

All cattle reacting to tuberculin in Canada, save those privately tested, are permanently earmarked by cutting a large T out of the right ear.

I may as well frankly state that the reason for this apparent inertia is that, so far, no satisfactory, intelligent method of dealing with bovine tuberculosis has been evolved, and we deem it wiser, before taking action, to await the results of the investigations, now being conducted by veterinary scientists in various countries, in the hope that some better way of dealing with the problem may be discovered.

Our knowledge of tuberculosis, the tuberculin test, and of their vagaries, has all along been defective and incomplete, and undoubtedly is so to-day, and when we bear in mind the many legislative mistakes which, owing to this lack of exact knowledge, have been made in the past, it must be admitted that caution is commendable, and that, before taking any definite departmental action involving the large interests which are at stake in such a country as Canada, it is reasonable that we should "look before we leap," and guard, as far as may be, against the possibility of having to recede, more or less ignominiously, from a position once taken.

Many of our medical friends, and some veterinarians whose zeal outruns their discretion, advocate compulsory testing and the slaughter of all reacting animals. At first sight, to men lacking practical experience, and perhaps devoid of responsibility, this policy may appear a very simple solution of the problem. That it is very far from being so, however, needs but little demonstration to an audience of this nature. All practical veterinary sanitarians, dealing in large matters, are, even without taking into consideration the painful experience of those communities which, in earlier days, were rash enough to adopt it, well aware, not only of the great difficulties to be encountered in carrying out such a policy, but of the fact that under ordinary circumstances, in spite of the great economic waste involved, its results are by no means so satisfactory as its advocates would like to have us believe. Most of us can remember the time when the majority of veterinarians, many of whom should have known better, believed that if a herd of cattle were tested, the reactors destroyed, and the premises disinfected, the disease was stamped out, and the owner might thereafter be left to follow his own courses. Intelligent men have, of course, understood from the beginning that there must be, in the very nature of things, a period of latency or incubation between the time of infection and that when an infected animal would react to tuberculin. This period was fixed in 1899 and 1900 by contemporaneous but entirely independent experiments, carried on by the Tuberculin Committee of the Royal Agricultural Society of England, and by Drs. Nocard and Rossignol, under the auspices of the Société de Médecin Vétérinaire Pratique of France. The results in both cases were practically the same, and showed the period of incubation, while depending somewhat upon the mode and degree of infection, to range from eight to fifty days. This fact, affecting vitally, as it does, both the original herd and any additions or replacements which may be made, is in itself a very serious obstacle to the satisfactory working out of a policy of compulsory testing and slaughter, even with liberal compensation. Taken in conjunction with the vagaries of tuberculin, especially on second, third, and fourth tests in the same herds, and the numerous ingenious methods adopted by owners, especially of pure-bred cattle, in order to defeat the test, it is

sufficient to exclude from the field of practical action this method of dealing with tuberculosis, except in small and circumscribed communities, in which all, or at least a majority of, the owners are alive to the necessity of stamping out tuberculosis and are willing to coöperate heartily with the authorities in bringing about that result.

This conclusion on my part has not been rashly arrived at. Ever since tuberculin was first used as a diagnostic agent in bovine tuberculosis I have been studying its action, and during the whole of that period my opportunities for such study have been considerably greater than fall to the lot of the average veterinarian.

Let us go a little more into detail. A herd of, say, one hundred cattle kept under ordinary stable conditions is tested, and twenty-five reactors are found. These twenty-five animals, together with any which, owing to the disease being in an advanced stage, may fail to react, but which are detected by clinical examination, are slaughtered and the premises carefully disinfected. It is not so very long, as I have already said, since many veterinarians were teaching that such a herd was safe and sound, and that, provided any animals added were carefully tested before being brought into contact, no further danger need be apprehended. This is, of course, very far from being the case. In the first place, a retest after three months will, depending to some extent on the virulence of the particular infection—a point of great importance—and the sanitary conditions, reveal perhaps from five to ten new reactors. Even after these have been destroyed and the premises again disinfected, the herd is by no means safe. The ten reactors, taking that as the number, have been living in close contact with the remaining sixty-five, and it is quite likely that three months later several of the latter will be found to be affected. Here also comes into play the uncertainty of tuberculin in repeated tests—a most serious consideration. In spite of Professor Vallée's important and valuable discovery,—which, I may say, does not by any means apply in all cases,—it is quite within the bounds of possibility that a number of animals, affected to a greater or less degree, will fail to react when tested for the third or fourth time. This acquired tolerance to tuberculin is one of its most serious limitations, and constitutes another difficulty somewhat hard to overcome. Let us admit, however, that after the lapse of a longer or shorter period, and a number of carefully conducted retests, the survivors of the original herd are properly pronounced healthy.

We must now take into consideration the question of additions and replacements—one which, from a business standpoint, is, in the majority of instances, of paramount importance to the owner. It is not enough to have the new animals tested before bringing them on to the premises. The same limitation, viz., that of the incubative period, applies to such tests as to

those with which we have been dealing. New arrivals must be isolated, not only from the original herd, but from each other, and submitted to a retest at the expiration of at least three months before being allowed to come in contact with any other cattle.

Two further points here demand our attention. We have hitherto, presumably, been speaking of tests honestly applied to the cattle of an honest owner, and by a capable, intelligent, and experienced veterinarian. We must now first consider some of the nefarious methods employed by dishonest and unprincipled owners to nullify the test, and so defeat the end in view.

The old method of dosing beforehand with tuberculin, although still followed in many herds, has largely lost its value through the discovery of Professor Vallée above referred to, and is now, as a rule, employed only when the testing veterinarian is agreeably complaisant, or a few years behind his age. It has, among the more astute breeders and dealers, been largely superseded by the practice of administering one or other of the modern antipyretics, combined for the sake of safety with other drugs, to such animals as are known to be tuberculous, or which show any rise of temperature when undergoing the test. This plan is beautiful in its simplicity. Temperatures are quietly taken from half an hour to an hour before the veterinarian makes his rounds, and the febrifuge, mixed with a little sugar and disguised in a handful or two of meal, is licked up by the animal without fuss or trouble. There is no drenching, no handling, no excitement; the temperature drops, and although there may be and often is thermal irregularity, there is no distinct rise, and, above all, no tuberculin arch.

This brings us to the second of my two further points, viz., the veterinarian making the test. While, with all its limitations, I have great confidence in the diagnostic properties of tuberculin, I must confess to a feeling of suspicion with reference to all charts that are in any degree, what I may term colorless, unless I know that the man who signs them is an honest, conscientious, wide-awake, and experienced veterinarian. Too many men take it for granted that everything is fair and aboveboard, and, depending entirely on their thermometer readings, allow themselves to be hoodwinked by dishonest and unscrupulous owners. I could go into many details, and perhaps furnish some amusement, by recounting a few of the artful dodges resorted to in order to keep the veterinarian away from his cattle between temperatures so as to permit of their being safely manipulated, but time will not permit. One thing, however, should be emphasized, viz., the fact that in the overwhelming majority of cases we have, in addition to the temperature rise, a distinct clinical reaction, some of the most salient features of which may be, and often are, only temporary, while others persist until at

least twenty-four hours after injection. Among the temporary signs which may be noticed, as a rule, from six to twelve hours after injection, are, in severe cases, rigors, often accompanied by staring coat, general excitation, and frequently diarrhea. In less well-marked cases we have coldness over the loins, quarters, thighs, and tail, subacute excitation, and general malaise. Even when these symptoms have passed off, the animal maintains a standing posture and is more or less stiffened; there is loss of appetite, rumination is suspended, and in milch-cows the flow of milk is diminished.

Close attention to and observation of the animals undergoing the test are, in my opinion, indispensable. Even with them it is possible for mistakes to be made; without them the tuberculin test is very apt to be badly discredited. The older veterinarians here will recollect that, prior to the discovery of tuberculin, much attention was paid, both by teachers and practitioners, to the clinical diagnosis of bovine tuberculosis. Of late years this phase of practice has been almost entirely lost sight of, the younger men practically depending on tuberculin as a diagnostic. This state of affairs is regrettable, and should be remedied by cultivating, with regard to cases of tuberculosis, that habit of painstaking observation which alone makes for success in the diagnosis of most of the other maladies to which dumb animals are subject.

I might perhaps explain that the foregoing remarks on the necessity of care and exactitude in making tests are intended to emphasize the idea that only skilful and specially trained men can with safety be employed in this work—no small difficulty in itself, when it comes to undertaking a universal and compulsory testing policy. There is still more to be said against compulsory testing and slaughter. Many reactors are but slightly affected, and while in the case of beef cattle in good condition the loss from their slaughter may be insignificant, it is a very different matter when valuable pure-bred herds, or even common-grade stock thin in flesh, are condemned. It is true that with the latter the question of compensation may be more easily settled than with the former, but the matter of economic waste is only one of degree, for while the pure-bred reactors might live out their natural lives and produce much valuable and, with proper precautions, healthy stock, the thin grades might be fattened and slaughtered under careful supervision for purposes of human food. For the reasons given above, I am convinced that, at least on any large scale, the policy of compulsory testing and slaughter is not a practicable one.

Turning to the policy of voluntary testing, or testing in response to applications from owners—now followed in certain of the United States and in several of the countries of Europe,—I would point out that not only do most of the arguments against compulsory testing apply to it with equal force, but several other factors come up for consideration. Among these

perhaps the most important is the fact that in testing only those herds in a country which are voluntarily submitted to the authorities, the progress made in the direction of eradicating tuberculosis must, of necessity, be not only very slow, but very uncertain. Even Professor Bang admits that, under the experience of repeated and often disappointing tests, the patience and courage of our Danish friends not infrequently fail, and they become weary of well-doing and relapse into carelessness. This phase of the matter is one which must be taken into account, and when with it is considered the fact that the last to ask for the test are, as a rule, the breeders of pure-bred stock, whose herds are the principal agents in disseminating disease, the ultimate ineffectiveness of voluntary testing is pretty clearly demonstrated. Owners must obtain fresh blood from time to time, and unless a man is heart and soul with the authorities in their efforts to clean up his herd, and takes every possible and minute precaution accordingly, it is, so long as tuberculosis exists in the country, only a matter of time until his stock relapses into a condition of disease.

In this connection I have read with much interest the plan proposed by Dr. Niven, medical health officer of Manchester, and supported by Professor Delepine and Mr. Brittlebank, the chief veterinary officer of that city, which includes the forming of disease-free islands by eradicating tuberculosis from certain farms and gradually extending the work over small districts, to be still further enlarged as the system finds favor with stock-owners. While there are some features of the scheme—such as the spending of public money in specially selected localities, to the exclusion of other tax-payers, and the supplying of sanitary buildings, through bringing pressure to bear on landlords or otherwise—which are scarcely applicable to conditions in America, it is, in my opinion, much more sensible and likely to be productive of ultimate benefit than the diffuse policy of promiscuously testing a herd here or there over an extensive territory, difficult, if not impossible, to keep under observation or control without an enormous staff of well-trained, experienced, and absolutely conscientious veterinary inspectors having no interest, beyond that of duty, in the herds with which they are called upon to deal or their owners. I might here say that the policy of employing local practitioners for this work has been repeatedly tried, and, in my experience at least, has not, in the majority of instances, proved either beneficial or successful.

I have nothing to say against the Bang system itself; in fact I am, and always have been, one of its most consistent advocates and admirers. I cannot, however, after thirty years' experience as a veterinarian on this continent, and with the knowledge acquired in that time of conditions on the ordinary North American farm, bring myself to believe that it is capable of successful general application on this continent.

There is no doubt that if all our stock-owners were thoroughly intelligent, well informed, anxious to rid their herds of tuberculosis, and gifted with an infinite capacity for taking pains, either the Bang system or that of Ostertag might be adopted, with every hope of a successful issue. As matters stand, we must, in order to deal with bovine tuberculosis effectively, have some definite policy of legal control, and the question, to my mind, is whether or not such control can properly be based on the tuberculin test.

At present I am inclined to favor a combination of the systems of Bang and Ostertag with that of the Manchester men, accompanied by a closer supervision of infected herds than is recommended by either of the two first-named authorities, so far as I understand their methods. All clinical or, if they can be detected, open cases of tuberculosis should be destroyed; all the adults in herds in which such cases are found to be treated as if diseased, marked and segregated accordingly; all milk from such herds to be pasteurized, whether used for human food or for that of animals; the progeny to be effectively separated from the adults, regularly submitted to the tuberculin test, and kept by themselves until the disease has been eliminated from the premises by the death or removal of the affected parent stock. Any animals added to the healthy herd would, of course, have to be tested on purchase, and retested after three months' careful isolation. I am free to admit that this plan is open to many of the objections which I myself have advanced against the other two already mentioned, but it appears to me to obviate the enormous economic waste and the tremendous popular opposition involved in the policy of compulsory slaughter, while it promises, if systematically applied and patiently and carefully carried out, infinitely better results than can be hoped for from that of promiscuously testing the herds of only such owners as are willing to submit them to the action of the authorities. The presence of one or more actual clinical cases of tuberculosis in any herd would constitute a perfectly defensible and reasonable ground for official action, and by making notification by owners or veterinarians compulsory, as in other scheduled diseases, reliable information on which such action could be taken would in most instances be forthcoming.

As has been well said by the editor of the "Lancet" in commenting on the recent able paper of Dr. Overland, of Norway, the famous address of Dr. Koch in 1901 has, after all, by stimulating others to investigation and research, been productive of good, perhaps to an extent sufficient to offset the hesitation and delay in actual practical effort which it undoubtedly caused.

As a result of that address, we veterinarians to-day know, or perhaps I should say have the proofs conclusive and satisfactory, of many things which we knew before, but were scarcely able to prove, regarding the transmissibility to man of bovine tuberculosis and vice versâ.

And this brings me to vaccination—a subject on which I have nothing to say, beyond that, up to the present, the published results of inoculation with bovo-vaccine are, from a practical viewpoint, singularly confusing, inconclusive, and discouraging. The immunity acquired under the most favorable conditions appears to be of short duration, and any advantage which may be gained is, to my thinking, more than offset by the danger of spreading the disease.

Where cultures of the human type are used, the risks appear to be, if possible, even more serious. Weber and Tirze, working under the direction of the German Imperial Health Office, report, according to Theobald Smith, that the udder of a cow vaccinated with a human culture shed human bacilli into the milk for a period of fifteen months.

Let us make haste slowly in work of this kind, and be sure of our ground before we issue any more of these definite pronouncements, which make nasty swallowing later on.

I have now briefly and inadequately placed before this Congress my views regarding the various methods recommended by scientists for the control of bovine tuberculosis. While these views may to some appear pessimistic, they are at least honest, and have been carefully considered with due regard to the responsibility which the veterinary sanitarian intrusted with large interests owes to humanity at large as well as to those interests. Dogmatize as we may, we are still groping, and in this, as in other matters of a like nature, those who have delved the deepest are the least sure of their ground.

In the mean time, while we are awaiting, as I fear we will for some time yet have to wait, the discovery of a certain and satisfactory scientific method of dealing with bovine tuberculosis, let us, as practical men, carry on an energetic campaign of education among cattle-owners and the general public. Bovine tuberculosis will be stamped out when individual owners realize that it pays much better to keep sound cattle than to lose money and feed in maintaining herds tainted with disease. In this campaign of education there should first be taken up a question in regard to which veterinarians have hitherto, in most cases, been culpably negligent. If there is one matter to-day in which veterinarians are behind the age, it is that of failing to insist, at all times, in season and out of season, on the importance of live-stock of thorough and effective stable ventilation. Having before us the object-lesson afforded by the medical profession, and the marvelous results which its members are achieving by open-air treatment, not only helping, but actually curing, advanced cases of tuberculosis, to say nothing of checking the disease, as is now daily done, in its early stages, it is nothing short of disgraceful that we are yearly permitting thousands of valuable animals to become infected, owing to the unsanitary conditions

under which their owners insist on keeping them. Of the truth of this contention, which is, perhaps, at first sight, rather sweeping, there is no lack of proof. In northern countries, where cattle are generally closely housed, and where a proper system of ventilation is the exception and not the rule, we almost invariably find bovine tuberculosis rampant. In milder climates, where animals have free access to fresh air, as, for instance, among the Hereford cattle in England, it is a rare thing to find a case of that disease. On the ranges tuberculosis is unknown, except where it has been introduced by some pampered stable-bred individual, and even such a one is more likely to recover than to die, provided the malady is not too far advanced and the first winter can be endured. To put the case plainly, stockmen are breeding tuberculosis a great deal faster through neglect of this important subject of ventilation than it would ever be possible to stamp it out by the promiscuous use of tuberculin and the slaughter of diseased animals.

I may be pardoned if, while on this subject, I refer briefly to an experiment which I have been carrying on for the last three years. A herd of forty-three cattle (twenty-one being dairy cows), twenty-eight of which had reacted to tuberculin, the remaining fifteen being apparently free from disease, has been kept under open-air conditions since the fall of 1905. The objects of this experiment, which is of a purely practical nature, are threefold: first, to ascertain the effect of open-air treatment upon the diseased cattle themselves; second, to ascertain to what extent healthy cattle, kept in contact with diseased cattle under open-air conditions, are subject to infection; third, to ascertain what percentage of healthy calves it is possible to rear from diseased cows, kept without any precautions under open-air conditions. The experiment is not yet concluded, nor have its results been properly tabulated for publication. I may say, however, that of the twenty-eight reactors, one only has broken down from generalized tuberculosis during the three years which have elapsed since the experiment began. One other has been killed owing to tuberculosis of the udder. Of the healthy animals kept in contact with them, feeding from the same racks, grazing over the same ground, drinking from the same pool, not a single one has become affected, and this in spite of the fact that from time to time animals suffering from acute generalized tuberculosis have been introduced to the herd and allowed to mix freely with its original members.

The results in the rearing of healthy calves, however, remind one somewhat of the Irishman's pigs, which, you will recollect, when killed, did not weigh as much as he expected, and he never thought they would.

Of the calves dropped and reared by reacting cows, 75 per cent. have so far entirely failed to react, while 25 per cent. have reacted at various ages ranging from four months to one year. One calf died at six weeks old from generalized tuberculosis, this case being probably congenital.

The results of the various tests of the original reactors, made at intervals of about six months, and in the last case after a lapse of twelve months, are exceedingly interesting, and will, when published, together with the post-mortem notes, merit the careful perusal of those who believe in the absolute reliability of tuberculin as a diagnostic agent.

I might add that the cattle have had no shelter but open sheds, and have, with exception of a few of the weaker individuals, been fed nothing but hay for the three winters during which they have been under observation.

It should be mentioned that through an error in judgment on the part of an overzealous herdsman, during the first winter our calves began to arrive in December of 1906, the first being dropped when the thermometer was 29 degrees below zero, the others following at intervals, sometimes very short, until the middle of March, 1907, and that in spite of this both dams and progeny throve well in the open air.

The results are very interesting, in view of the present tendency to consider the digestive tract the most frequent and certain channel of infection. While the experiment above outlined assists in proving that young animals can be and are most frequently infected through the digestive system, it also, to my mind, shows that in the case of adults infection through the air-passages plays an important part.

I feel satisfied, and I think all practical men will agree, that had the healthy cattle in this experiment been kept under ordinary stable conditions with their diseased companions, they would not have escaped as they have done.

The highest medical authorities are nowadays advising, and with the very best possible results, our modern hot-house humanity to get "closer to nature" in every possible way. The advantages of adopting a similar policy in the handling and housing of domestic animals are too apparent to admit of discussion. Nature has furnished our animal friends with every conceivable requisite for protection against ordinary climatic conditions, and most of the diseases and disabilities to which they are subject have been caused by, and owe their continuance to, the irrational artificial conditions imposed upon them by well-meaning but ignorant, or rather unthinking, owners and attendants.

I am here, however, to learn and not to teach. The problem of the control of bovine tuberculosis is undoubtedly the most serious confronting the veterinary sanitarian of to-day, and if the labors of this Section of the International Congress result in its solution, I for one will be forever grateful.

DISCUSSION.

Dr. Butler: There was one point made in the last paper regarding the open-air treatment for tuberculous animals. I think it may be of

interest to recite an experiment in which an attempt was made to control tuberculosis in a herd. The animals were tuberculin-tested and the reacting animals slaughtered. Two or three subsequent tests were made, and again all the reacting animals removed. One of these animals afterward began to show evidence of ill health, and was finally dried up and placed in the open with a herd of 33 head composed of non-reacting dry cows and young beef cattle from two to three years old. After remaining with these cattle for about three months, she was still showing evidence of disease. The tuberculin test was applied and she reacted. These cattle were kept in the open air, during which time they were well fed and received some grain. In making a later test of the animals which failed to react we got 13 reactions out of 33 head of cattle, and on post-mortem examination these 13 animals were found to be tuberculous. We condemned one of them as being unfit for human food. Now, I can hardly accept the speaker's statement that open air will prevent the development and spread of tuberculosis. There was absolutely no indoor exposure to this particular cow. When the test was first made of these 33 animals, they were inside. They were put out about two months afterward, but while in the stable they were not exposed to this particular cow.

Dr. C. C. Hayden: I think we often make too much of this open-air and outdoor life. I had a similar experience with some animals in which I found that the disease was transmitted in the open air just the same as indoors.

Dr. White: I feel that in Ohio there are two things which are doing more to disseminate tuberculosis than anything else. One is the indiscriminate use of tuberculin, which is being applied by some farmers of that State, by which the unscrupulous farmers inject their animals with tuberculin before selling in order to deceive the buyer, and this is practised by men who own some of the largest herds. Another thing is this fallacy of fresh-air treatment. The fresh-air treatment, in my opinion, is not very beneficial to the animals in preventing the development of tuberculosis. Cattle, whether tuberculous or not, are generally from eight to ten months outdoors, and besides there is usually in the poorest barns sufficient ventilation through the doors, windows, large cracks, and otherwise by which plenty of fresh air is supplied to the animals. I can cite you instances of the dissemination of tuberculosis under these open-air conditions. I do not think that Dr. Rutherford believes as he says in this matter. I know that his method of dealing with a very similar disease in horses is opposed to the method which he advocates for the suppression of tuberculosis. At Columbus, Ohio, we tried the open-air method, and I will not go into the details more than to say that the disease increased by this method. In a combination with the Bang method we increased tuberculosis in our dairy herd in one year's time from 5 to 38 per cent.

DR. RUTHERFORD: These gentlemen are laboring under a misunderstanding. I do not believe that the open-air treatment is a cure for tuberculosis. I do say, however, that fresh air is a good thing for cattle—that is all I said in my paper. I did not say that tuberculosis was cured and prevented. I am advocating fresh air as a valuable thing in the case of tuberculous animals.

DR. RICHER (Canada): I have listened to the paper of Dr. Rutherford with a great deal of interest, and I am proud to say that I am also of the opinion that fresh air is a very beneficial thing for tuberculosis in animals. I am glad that this point was brought out, and also the careless manner in which tuberculin is used. I would suggest that more experiments be carried out with the open-air treatment in order to obtain definite data on that important point. I am convinced that these questions are most timely, and undoubtedly show that Dr. Rutherford has given the matter study and observation. His conclusions are very practicable. The point which I wish to bring out is with reference to ventilation and the possible application of the open-air treatment as a preventive and not as a curative method. Near the borders of his own State experiments have been going on for years, and I think Dr. Higgins can tell you something of the experiments, which were carried on with success. There is no reason why the problem should not be experimented with officially by some of the departments of agriculture with the view of fully testing that theory. When we find cattle affected with tuberculosis, it might be advisable to experiment with this fresh-air treatment in the stable.

DR. BRYCE (Canada): There is a side of this question which has not been approached and which I had hoped would be discussed. Two questions are involved: One is a commercial question as to the curability of tuberculosis in cattle of valuable herds. Another is what should be recommended to State and municipal officers of health as practical measures for protecting children from tuberculous milk of the dairies. Can we expect some practical suggestions as to methods which could be put in force by municipal boards of health with regard to licensing dairy herds which supply town milk, or some method of separating from these herds the cows which are tuberculous? What have we of practical methods to be submitted? What practical methods can this Section suggest with regard to protecting the people, and are there any known measures, in addition to the fresh-air treatment, for protection against tuberculosis in dairy herds?

DR. NELSON: Dr. Rutherford has taken a very strong stand of conservatism. In my opinion it is a little too strong, because, although we know that conservatism is a strong factor in doing all kinds of work, yet a little radicalism prevents us from going backward. He stated that he was waiting until he saw that other countries were meeting with success in the control

of tuberculosis, and that he was going to let other people make the mistakes. Suppose we all did this, what progress would be made? I have made mistakes myself simply because I tried to progress, and possibly too fast, but I think the best progress I have made is due to the mistakes, to a great extent. I am quite sure that Dr. Rutherford would have no man serving under him unless he was a progressive man and liable to mistakes. I believe that the compulsory tuberculin testing of herds has been a mistake, but it has been an advantage to all of us. The more people, the more farmers, we can get to voluntarily request us to test their herds, the better off we are. My experience has been that in getting one good man to test his herd he will exert favorable influence upon his neighbors. I think that by educating the farmers in this respect they will seek our assistance, and in this way more satisfactory results will be obtained.

Dr. Mayer (Louisiana): I have always been an ardent protagonist of the Bang system as affording the only rational solution of the problem of eliminating tuberculosis from dairy herds and preventing the enormous economic loss which would follow a wholesale slaughter of all reacting animals; hence in revising the sanitary code of Louisiana, I included the Bang system. Later, on consulting veterinary experts, I was forced to recognize the truth of Dr. Rutherford's assertion that it requires infinite pains,—more than the average farmer on this side is willing to give,—so the following modification was added to the code, which it seems to me is practical, relieves the individual farmer of the trouble of eliminating tuberculosis from his herds at the minimum of loss, preserves high-grade stock, and protects the public health by the exercise of coöperative efforts:

N. *The Bang Method of Reducing and Eliminating Tuberculosis in Dairy Herds.*—(1) Every owner of a dairy herd supplying milk to the public must have his cattle tuberculin-tested, and all reacting animals in bad condition must be slaughtered. The reacting animals that show no physical evidence of disease must be isolated, and may be kept for breeding purposes.

(2) The offspring from the reacting cows must be promptly removed from their dams, and fed milk from non-reacting cows or the pasteurized (heated to a temperature of 165° F.) milk from the reacting ones.

The milk of the isolated cows, after pasteurization, may also be used for human food and sold, providing the purchaser is duly acquainted with the facts.

(3) If any of the isolated cattle give evidence of enlarged glands, or emaciation or other evidence of the disease advancing, they must be slaughtered.

(4) The non-reacting animals must be tested at least twice a year at intervals of six months, and if any individuals react, they must be placed with the isolated ones.

(5) The calves which are raised from the reacting cows, and which fail to react to tuberculin, may be placed in the sound herd.

(6) The isolated cattle may be fattened and killed under proper inspection for beef, providing the evidence is clear that the disease is localized.

Whenever any municipality, ward, parish, or other political subdivision of the State deems it impracticable or too expensive to carry out the provisions of the preceding sections, they may, if they so elect, through the town council or police jury, establish:

(*a*) A breeding farm for the purpose of segregating all cows in said community reacting to the tuberculin test, but which exhibit no physical evidences of the disease;

(*b*) Or cows which possess special breeding qualities and in which the tuberculous infection has not sufficiently progressed to interfere with their usefulness as breeding stock;

(*c*) Said farm to be provided with a pasteurizing plant and to be under the supervision of the municipal or parish board of health;

(*d*) The manager, if possible, to be a veterinarian, or at least one versed in the Bang method of eliminating tuberculosis in herds;

(*e*) The division of proceeds accruing from sale of cattle, or their increase to take place annually and the proceeds of the milk sales to be divided quarterly;

(*f*) The municipality or parish retaining a percentage based on the actual per capita expense of keeping, housing, and feeding the stock; the owner receiving the balance in money, if he so desires, at the market value of the stock at the time of sale;

(*g*) Or he may let the increase of stock remain on the farm to be kept for breeding purposes, or for sale, as the management may deem advisable, for all interests concerned;

(*h*) All other cows, except those hereinbefore mentioned in which the physical evidences of tuberculous infection are apparent, must be killed;

(*i*) If killed by the kosher method and inspected by a veterinarian or by an inspector trained in the physical appearance of tuberculous meat, the meat may be sold for human consumption, if otherwise free from disease, provided, first, that the infection is localized; second, that the purchaser is duly acquainted with the fact that it is meat from a tuberculous animal; third, that it is sold from a stall from which none other than this class of meat is sold; fourth, the proceeds of the sale of the meat, hide, and trimmings, less the actual cost of inspection, killing, and selling, must be paid over to the owner; fifth, nothing herein contained is to be construed as preventing the establishment of coöperative farms, or even private farms on the same system, providing they are under the supervision of a resident inspector of the municipal, parish, or State health authorities.

Dr. Wladimirof (Russia): I have absolute confidence in tuberculin, and in my experience I have found that by careful usage it renders very valuable service. We have no law compelling the use of tuberculin in my country. The government furnishes the assistance to those desiring to have the test made. When our people once get control of the disease in a herd, they make an effort to keep that herd free from the disease by applying the test year after year. By careful use and observations I have made no mistakes in the use of tuberculin except where the disease was very far

advanced. In the discussion of this subject two questions, one pertaining to the hygiene, the other to the diagnosis, should be kept distinctly separated.

DR. RUTHERFORD: I would like to ask that the members of this Section be a little more charitable. If they will reconsider the contents of my paper, they will find that it is remarkable for its absence from recommendations, as I did not have anything to recommend. I am waiting for information and knowledge. Referring to the remarks of my friend from Washington State, I am quite willing that he go on making mistakes—I want everybody to go on. That is one reason why I have been watching other people. If I were to make a mistake in a policy which extended over Canada, I think that in about six months there would be nothing of me. I want to listen and learn, and I am waiting for people who know more than I do to make mistakes. I am not opposed to the tuberculin test, and I say this in the light of many years of experience. The tuberculin is undoubtedly reliable in the first test, provided there has been no underhand attempt to interfere with it. Tuberculin is an almost infallible diagnostic agent for tuberculosis. Professor Bang says that it is not infallible, but almost so; but when you come to the second, third, fourth, or fifth test in the same herd, I do not consider it at all reliable. I can show records in my office of tuberculous animals that have reacted under honest conditions, that have failed to react, and have again reacted, and again failed to react. Under these conditions I say that we cannot depend absolutely upon tuberculin in the second, third, fourth, or fifth test. I wish to call attention also to the importance of clinical evidences and symptoms in diagnosing this disease. We are losing the practical side of the question when we lose sight of the clinical aspect of diagnosis. Is there a man in this Section who can say that it is right and proper for Canada or any other country to base legislation on the tuberculin test? I am not prepared, under existing conditions, to assume official control and take legislative action on the authority of the tuberculin test alone at this stage of our knowledge. I want something more definite. If we can get clinical cases in a herd, then we can take legislative action against that herd. We then have evidence of the existence of the disease there.

At the conclusion of this discussion the Section adjourned till half-past two o'clock.

SECTION VII.

Tuberculosis in Animals and Its Relations to Man (*Continued*).

EIGHTH SESSION.

Friday, October 2, 1908.

CONTINUING THE DISCUSSION OF THE CONTROL OF TUBERCULOSIS IN ANIMALS.

The Section was called to order by the President, Dr. Leonard Pearson, at half-past two o'clock.

HISTORY OF THE AGITATION AGAINST BOVINE TUBERCULOSIS IN MASSACHUSETTS,

RESULTING LEGISLATION, AND LESSONS TO BE DERIVED FROM THE ATTEMPTS OF THE STATE TOWARD ITS ERADICATION AND CONTROL.

By Austin Peters, M.R.C.V.S.,
Chief of the Cattle Bureau of the Massachusetts State Board of Agriculture.

Massachusetts was one of the first States, if not the first, to enact legislation for the eradication and control of contagious animal diseases; if not the first, she was certainly the first to enact laws that were effective, as a cattle commission was appointed in 1859 to stamp out contagious pleuropneumonia, which had been imported from Holland in a herd of Holstein cattle and spread to various parts of the commonwealth, and these efforts were crowned with success, the disease being extirpated within her borders by 1865. Other States where contagious pleuropneumonia existed seem to have been incapable of accomplishing this result, and it was not stamped out in other localities where it had obtained a foothold until the United

States Bureau of Animal Industry was organized and the Federal authority took charge of the matter. It was only natural, therefore, that Massachusetts should be one of the first States to enact legislation for the suppression of bovine tuberculosis, and a brief history of the campaign, with the lessons to be derived from it, may be of interest. But first it seems essential to give a short account of the history of the agitation against this disease, which finally led to the adoption of legislation including it among the diseases of animals recognized by law as contagious.

To the late Dr. Noah Cressy, of Hartford, Connecticut, is due the credit of the first attempt to call the attention of the agriculturists of Massachusetts to the nature, importance, and seriousness of bovine tuberculosis. As a speaker at several farmers' institutes in western Massachusetts in the winter of 1879 and 1880 he delivered several lectures upon this disease, which were reported in the "Springfield Republican" in January and February, 1880. His addresses created quite an excitement for the time being among farmers in the localities where these institutes were held, but attracted little attention beyond this, and the excitement soon subsided.

The report of the first farmers' institute at which Dr. Cressy (who at that time resided at Amherst) spoke is given in the "Springfield Republican" of January 30, 1880. The article is headed "A Rural Sensation," and is an account of a meeting held at Warren the previous day, where he gave a lecture on "the diseases of farm animals," among them tuberculosis in cattle. Among other statements he made was that the herd of cattle at the Massachusetts Agricultural College was infected with tuberculosis, and that the trustees were allowing cattle of various pure breeds to be bred there, and permiting the progeny to be sold to the farmers of the State for the purpose of improving their stock, whereas in reality animals were being sold to them infected with a dangerous disease, which was being thus disseminated among the herds of the commonwealth.

A sensation was created during the lecture by the appearance of a Mr. Paige, of Hardwick, in a wheeled chair, who told how he bought three Ayrshire heifers from the Agricultural College in the spring of 1877; that in November, 1879, he had one killed for beef and found her badly diseased, and that he attributed his paralysis and also a blood poisoning in his children to the use of the milk from these heifers. He also showed specimens from the side of one of these heifers, which Dr. Cressy said were lesions of tuberculosis of long standing. Dr. Cressy gave it as his opinion that Mr. Paige's paralysis and the sickness in his children might have been caused by the use of milk from tuberculous cows.

Dr. Cressy also referred to an auction sale of cattle at the Agricultural College the previous summer, and the possible harm to the herds of the State by the dissemination of these animals.

The report of the meeting also conveys the idea that Dr. Cressy, who had formerly been professor of veterinary science at the Agricultural College, had severed his connection with the institution on account of differences of opinion between himself and some of the members of the faculty upon the question of bovine tuberculosis. The "Springfield Republican" of January 31, 1880, quotes Prof. Levi Stockbridge, who had been at the college thirteen years, as saying that the college never bred an animal that had tuberculosis there or developed it within two years of the time it was sold; furthermore, that the statement that Dr. Cressy left the college because he disagreed with some of the faculty on the presence of tuberculosis in the college herd "is an unmitigated and outrageous falsehood." Professor Stockbridge is also reported as saying that "the disease is only consumption, and may attack any breed of cattle in any part of the country; that the milk is healthy until the animal's constitutional vigor is utterly reduced; and that Mr. Paige's statement that the milk gave him paralysis is preposterous."

In the "Springfield Republican" of February 4, 1880, is a short editorial advising that the college authorities should court a most searching investigation, with a view either to disproving Dr. Cressy's assertions, or, if true, to setting matters right.

The "Springfield Republican" of Friday, February 6, 1880, has an account of a farmers' institute at the town hall in Brookfield the previous day. This meeting was largely attended, as Dr. Cressy's previous lecture at Warren had attracted a good deal of attention. Prof. Levi Stockbridge, who was professor of agriculture at the Massachusetts Agricultural College, was present and took the platform early in the proceedings. He had a newspaper with a report of Dr. Cressy's previous lecture in his hand, and read passage after passage of Dr. Cressy's statements concerning the college herd and the sale of diseased animals from it, and asked him as he read each sentence if he (Dr. Cressy) ever made any such statement, and as each question was asked Dr. Cressy, very red in the face, would shake his head. As a matter of fact, Dr. Cressy's statements concerning the condition of the college herd and the danger to other herds by the introduction of cattle from it into them were correct. At that time a cat could not be kept in the cattle barn at the Massachusetts Agricultural College without developing a cough, becoming emaciated, and pining away in a few months. Dr. Cressy should have maintained the position he took at first, but evidently lacked the courage to do so. After Professor Stockbridge finished his remarks, Dr. Cressy gave a very good talk upon bovine tuberculosis, its nature, and the danger from it to the herds of the State, refraining, however, from any allusion to the condition of the herd at the State Agricultural College.

This seems to have been the end of the agitation regarding bovine tuberculosis in Massachusetts, so far as Dr. Cressy was concerned. What he said

did not carry a great deal of weight, for the reason that the farmers thought him a disgruntled individual who was endeavoring to injure the college because he had been dismissed from the faculty a few years before, at a time when the trustees of the college had to economize and decided that the position he held could better be dispensed with at the time than any other. If it had not been for the prevailing idea that he was airing a grievance, which discredited his endeavors, much good might have come from the agitation he started. Cressy's ideas were evidently largely taken from Walley's "Four Bovine Scourges," and were decidedly in advance of the times. Walley, in his "Four Bovine Scourges," published several years before Koch's famous discovery, includes tubercle with the other three great contagious diseases of cattle, viz., contagious pleuropneumonia, foot-and-mouth disease, and rinderpest. In the preface to his work he speaks of these four diseases as being of "more importance to the stock-owner than all the other ills to which bovine flesh is heir." He also says that while "the three first-mentioned diseases are only too well known, the last (tubercle) is less perfectly so, even, it may be said, to the veterinary surgeon."

Walley in his work expresses his belief in the communicability of tuberculosis from one animal to another, his belief in the danger to man from the use of milk and meat from tuberculous animals, and his opinion that tuberculosis is identical in man and the lower animals. He quotes from the experiments of Vellemin, Gerlach, Viseur, Grad, Zundel and other veterinary and medical authorities in support of his views.

Dr. Cressy, in his lectures at the farmers' institutes, simply voiced Walley's opinions, and the views he expressed then were no less true or different from the views held by many scientific men at the present time, but which were not then generally accepted as true by the medical profession, because they lacked the conclusive proof later announced by Koch when he made known to the world his famous discovery of the tubercle bacillus. There were a few faint echoes following the agitation started by Cressy, although nothing more was heard from him personally. The "Springfield Republican" of Monday, February 9, 1880, mentions the report of the trustees of the Massachusetts Agricultural College for the year. The part relating to the college herd reads in part as follows: "that from the most thorough investigation we have been able to make, the statement that disease has been propagated by the sale of cattle from the college farm is absolutely false, and we ask that the matter be referred to the commissioners of contagious diseases for a most rigid investigation." (Professor Stockbridge was professor of agriculture at the college, and one of the cattle commissioners at this time.)

The cattle commissioners, in their report to the legislature of Massachusetts, January 7, 1881, refer for the first time to bovine tuberculosis. The

report mentions the commission being called to visit a herd in Grafton, Worcester County, where a number of cattle were found suffering with this disease, and also mentions the fact that the disease had been found in three or four other isolated localities within that year. It says:

"It has been the occasion of much excitement and alarm by sensational statements of its contagiousness. That it is so, the best authorities are not agreed. Yonatt, in his work on cattle published in 1840, says: 'Animals which exhibit decided symptoms of consumption should be removed from the dairy, not because the disease is contagious, but because it is undeniably hereditary.' Recent experiments have been made to test the contagiousness of tuberculosis, both by inoculation and the ingestion of tuberculous matter; and Fleming says, 'The facts elicited affirm that it may be thus communicated.' Several investigators in this direction have failed to produce corroborating results, and others say that no results have yet been reached of any value in this direction.

"The question of the contagiousness and virulence of tuberculosis is still under consideration, and further researches are necessary to elucidate and establish certain important points respecting it. We have, therefore, declined to consider it within the intent of the law which prescribes our duties and obligations. During the excitement occasioned by the supposed prevalence of this disease, a report reached the Board of Agriculture that the cattle on the Agricultural College farm at Amherst were infected with it, and the members, in their capacity as overseers of the college, passed a resolve requesting the commissioners to make a careful examination of the stock and its condition. Complying with this request, Dr. E. F. Thayer, the veterinarian of the Board, made the examination, and reported to the overseers that 'the appearance of the animals, without exception, was that of perfect health. Not one could be found that required physical examination; percussion and auscultation were tried on one without eliciting other than a normal and healthy condition.'"

The above is a portion of the annual report of the cattle commissioners, dated January 7, 1881. This portion of their report for 1880 is here given in detail because it seems to be the first official recognition, or a declination to recognize, tuberculosis among cattle in Massachusetts, and this communication from the cattle commissioners was in reality the result of Dr. Cressy's agitation of the matter the previous winter.

The late Prof. Levi Stockbridge, and also the late Dr. Josiah H. Stickney, of Boston, have informed the writer that during the campaign against contagious pleuropneumonia in 1860 to 1866, occasionally cases of bovine tuberculosis were met with, but little attention was given to them; the cattle commission was stamping out contagious pleuropneumonia, and this disease was not contagious pleuropneumonia, was not known to be contagious, and therefore little thought was given to the few cases met with.

In their report to the legislature dated January 10, 1882, the cattle commissioners, speaking of lung diseases in connection with contagious

pleuropneumonia, write as follows: "Inflammation of the lungs, or tuberculosis, may be engendered in the stock of any farm by undue exposure, want of ventilation, or confinement in damp and filthy inclosures. But contagious pleuropneumonia, which has symptoms resembling those diseases, is the result of contact with an animal possessing the infection, or with some object he has infected, and is disseminated from animal to animal, like smallpox or measles in the human family. The appearance of lung disease on remote and isolated farms, unless it can be traced to contact with animals from abroad, should cause no alarm, but should prompt the owners to a careful hygienic examination of their premises and methods of stock management."

There is no further mention of bovine tuberculosis by the Massachusetts cattle commissioners in their reports for four years, but there was a lecture read at the public winter meeting of the State Board of Agriculture at Framingham, in December, 1885, upon "Tuberculosis in Cattle," prepared by Dr. Frank S. Billings, of Boston, who unfortunately was not present to deliver it in person, hence there was little discussion of the paper. As this lecture was given after the discovery of the tubercle bacillus by Koch, it was more in accordance with modern ideas than the statements in the former reports of the cattle commission. Space will not permit a résumé of this paper, but it can be found in the report of the Secretary of the Massachusetts State Board of Agriculture for 1885.

In June, 1885, the personnel of the Massachusetts Board of Cattle Commissioners was changed: Dr. Thayer and Mr. Jordan retired, and Mr. A. W. Cheever, agricultural editor of the "New England Farmer," and Dr. J. F. Winchester, a young veterinarian of Lawrence and a graduate of the Massachusetts Agricultural College, were appointed to replace them, and Professor Stockbridge was continued in office.

At a special meeting of the State Board of Agriculture, held at the townhall at Barre, Mass., November 29, 1886, called at the request of the cattle commissioners, Dr. Winchester addressed the meeting, calling attention to the presence of bovine tuberculosis in the State, its heredity, transmissibility, and insidiousness, and the difficulty of the diagnosis, and his inability to assist owners of infected herds under existing laws. He was followed by Professor Stockbridge, who stated that the Board of Cattle Commissioners had long known of the existence of bovine tuberculosis in Massachusetts, but that the veterinary colleges had never agreed upon the question as to whether it is contagious or not. "There has been a long and acrimonious dispute in relation to it, and the consequence has been that the cattle commissioners have never recognized it or treated it as a contagious disease." After considerable discussion it was decided that if additional legislation regarding it was necessary, the cattle commissioners were the ones to recommend it to the legislature and to attempt to procure it. The cattle com-

mission, in its report to the legislature, January 7, 1887, refers to tuberculosis among cattle, its nature and dangers, and in conclusion says: "Notwithstanding all that is certainly known of the disease and the great losses it entails, yet it is surrounded with such obscurity and uncertainty, and presents such apparently insurmountable obstacles to its eradication, that we have made no direct attempts to combat it; but some of our citizens, to rid their herds and premises of the pest, have, during the past year, destroyed many thousands of dollars' worth of cattle."

If the cattle commission made any attempt this year to obtain legislation on bovine tuberculosis, nothing came of it. In their report of January 6, 1888, for the year 1887, the cattle commissioners again speak of the prevalence of tuberculosis among cattle, its peculiarities and the difficulty of eradicating it "by force of our present statutes or any appropriation the legislature would make." It says the disease prevails to about the extent of the previous year, but suggests that as the veterinary profession increases in number "attention is called to it more and more, and there is a call for more active work."

In the report of the cattle commission of January 7, 1889, for the year 1888, there is a special report by Dr. J. F. Winchester upon tuberculosis, showing by tables its prevalence and losses in certain herds to which his attention had been called. In 1889 Dr. Winchester's term expired, and the late O. B. Hadwin, of Worcester, was appointed to the vacancy.

Tuberculosis among cattle had now attracted so much attention that it could not be ignored. The reports of the cattle commissioners for 1889, 1890, and 1891 give the subject a certain amount of consideration, although the position taken is rather one of not unduly alarming the public or of exaggerating the danger from it. The report for 1891 exhibits considerable ire against the State of Maine for prohibiting the shipment within her borders of neat cattle from Massachusetts because of the prevalence of bovine tuberculosis within the latter commonwealth, and remarks that the action of Dr. Geo. H. Bailey, veterinarian to the Maine cattle commission, is unconstitutional, and quotes a decision of the United States Supreme Court in support of this view, in reference to Missouri forbidding bringing cattle infected with Texas fever within her limits, "because it attempted to interdict or control commerce between the States, which was a power conferred by the Constitution only upon Congress." Since then there have been other opinions of the United States Supreme Court that a State can take measures to protect itself from the introduction of a disease that may endanger the health of its people or live-stock.

Late in 1886 or early in the winter of 1887 the writer of this paper, who was at that time investigating contagious bovine abortion for the Massachusetts Society for Promoting Agriculture, remarked to the late Ebenezer

Francis Bowditch, of Framingham, one of the trustees of the Society, that it would be very interesting to investigate the danger from the use of milk from tuberculous cows. While it was generally conceded that a cow with a tuberculous udder gave off tubercle bacilli in the milk, it was suggested that an investigation to show how slightly diseased a cow might be, and yet be dangerous, might be of value. The trustees of the Society decided that such an investigation would be of value, and decided to undertake the work. The writer, while he was the Society's veterinarian, advised that to make the results of the work carry the greatest possible amount of weight the services of a man who had already made a name as a scientist, and whose signature to a report would secure immediate recognition, should be secured to direct the experiments and prepare a report of the results.

The services of Dr. Harold C. Ernst, of Boston, professor of bacteriology at the Harvard Medical School, were secured for this purpose. A committee of the trustees of the Society for Promoting Agriculture, consisting of the late Thomas Motley, its president, the late E. F. Bowditch, the late Jacob C. Rogers, and General Francis Henry Appleton, was appointed to have charge of the work.

A farm was rented at Mattapan, a suburb of Boston, as an experiment station, in the spring of 1887, where a herd of tuberculous cows was kept for over three years, and feeding and inoculation experiments conducted and bacteriological examinations of the milk and cream made at the Harvard Medical School. Dr. Ernst supervised much of the work and wrote the report, but a great deal of the actual work was performed by Dr. Henry Jackson, Dr. Langdon Frothingham, and the writer of this paper. A report of the results of these researches was presented to the trustees of the Society in the autumn of 1890, and was later published in book form at its expense under the title of "Infectiousness of Milk."

It was found that milk from a herd of tuberculous cows contained tubercle bacilli as demonstrated by both microscopical examination and inoculation experiments, and that milk from these cattle was capable of producing tuberculosis in calves and pigs fed upon it in from 33 per cent. to 50 per cent of the young animals fed. Milk-feeding experiments were tried on rabbits, but with much less positive results, due no doubt to these little animals drinking less milk proportionately to calves and pigs.

Besides the results of the experiments at Mattapan the report contains a voluminous correspondence elicited by letters written by Dr. Ernst asking the views of members of the veterinary and medical professions on the infectiousness of milk, and reports from veterinarians upon the prevalence of bovine tuberculosis in various localities. Dr. Ernst concludes the report as follows:

"I have presented, in the preceding pages, the evidence that we have

been able to collect upon the points in regard to which information seemed to be especially needed. This evidence is sufficient, it appears to me, to warrant certain definite conclusions, as follows:

"1. While the transmission of tuberculosis by milk is probably not the most important means by which the disease is propagated, it is something to be guarded against most carefully.

"2. The possibility of milk from tuberculous udders containing the infectious element is undeniable.

"3. With the evidence here presented, it is equally undeniable that milk from diseased cows with no appreciable lesion of the udder may, and frequently does, contain the bacillus of this disease.

"4. Therefore, all such milk should be condemned for good."

The Massachusetts Society for Promoting Agriculture presented the results of these investigations to the legislature of 1891, on January 13th, by petition asking for legislation to secure an inspection of cattle in Massachusetts. After a delay of several months the legislature passed the following:

"*Chapter 118, Resolves of 1891.*

"Resolve providing for an investigation by the State Board of Agriculture into the dangers arising from tuberculosis in the food-products of cattle.

"*Resolved,* That the State board of agriculture be instructed to investigate and ascertain the best methods to be adopted in order to protect the citizens of this Commonwealth against the dangers to human life and health which may arise from the presence of tuberculosis in the food-products of cattle, with power to employ expert assistance, and report in print the result of their investigations to the next general court, with such recommendations as they may deem advisable. And for the purpose aforesaid, they may expend such sum, not exceeding twenty-five hundred dollars, as they may deem necessary, which sum shall be allowed and paid out of the treasury of the Commonwealth. (*Approved June 11, 1891.*)"

The appropriation provided was much less than was recommended, and was so small as to negative the purpose of the resolve. The State Board of Agriculture reported to the legislature of 1892, in compliance with the requirements of the foregoing resolve, that because of the small amount appropriated, the Board of Agriculture did not think that it could add much to the information already obtained, but it made certain suggestions for legislation relating to bovine tuberculosis, much of which was later incorporated into the statutes of the commonwealth.

Primarily to the Massachusetts Society for Promoting Agriculture belongs the honor of bringing to public attention the prevalence of bovine tuberculosis, and the dangers from the use of meat and milk from tuberculous animals, and it largely deserves the credit for final legislative action. The Massachusetts legislature of 1892, ten years after the discovery by Koch of

the tubercle bacillus, declared tuberculosis to be one of the contagious diseases of animals recognized by the statutes of the commonwealth, and provided for the killing of diseased cattle without appraisal or payment. It also made the law providing for the appointment of inspectors of animals in the various cities and towns of the State mandatory; prior to this it had been permissive since 1876, but only a few municipalities had availed themselves of it. Later the law was amended to provide that these appointments should be subject to the approval of the cattle commissioners; it also provided that the Board of Cattle Commissioners could appoint inspectors of animals where cities or towns refused or neglected to do so, and that they could remove inspectors for incompetency or just cause. In 1893 the legislature also enacted a law providing a penalty for any city or town that refused or neglected to appoint an inspector or inspectors of animals and provisions. In 1908 the legislature passed a law that one of the inspectors of animals annually appointed in cities shall hereafter be a registered veterinary surgeon. As a matter of fact, nearly all the cities and larger towns already had veterinarians for inspectors of animals.

In the spring of 1892, at the request of Gov. Wm. E. Russell, the cattle commissioners, Messrs. Stockbridge, Cheever, and Hadwin, resigned, and the governor reappointed Professor Stockbridge, the old wheel-horse of the commission, and named to serve with him two veterinarians, Dr. Charles P. Lyman, dean of the faculty of the Harvard Veterinary School, and Dr. Maurice O'Connell, a veterinarian living in Holyoke, who qualified May 12th and immediately entered upon the discharge of their duties.

During their first year in office eighty-one head of tuberculous cattle were killed without appraisal or payment.

The cattle commission of three members continued as above until June, 1894, when the Board was increased to five; owing to the increasing interest in bovine tuberculosis and the demand for a greater amount of work it was decided that three men were not sufficient, and that the Board ought to be larger. Dr. Frederick H. Osgood, a professor at the Harvard Veterinary School, and Leander F. Herrick, of Worcester, were appointed. The act of legislature increasing the commission to five members also provided that one-half the value of neat cattle killed by the State authority as tuberculous shall be paid by the commonwealth, the appraisal to be based on the value of the animals for food or milk. In October, 1894, Charles A. Dennen, of Pepperell, was appointed a member of the Board, to fill the vacancy caused by the retirement of Professor Stockbridge, after twenty-seven years' service, who resigned at the end of his term of office. He might have been reappointed for another term of three years, but preferred to relinquish the position, as he had become an old man, and the duties were becoming more arduous and assuming greater proportions than formerly.

In September of 1894 the Board of Cattle Commissioners first introduced the use of tuberculin as a method of diagnosis, and immediately instituted its use upon a large scale. The tuberculin test was applied to all the cattle quarantined on suspicion by the local inspectors of animals, also upon cattle brought into Massachusetts from adjoining States, and a systematic testing of entire herds was undertaken, the commissioners stating that it was their intention to test all the herds in the State and kill reacting animals, starting in the southeast corner. This season the entire bovine population of Nantucket Island was tested, only 0.9 per cent. of the cattle reacting. The assertion that the commission intended a compulsory test of all the cattle in the State aroused a great deal of opposition in some quarters. During the autumn the local inspectors quarantined 3295 cattle on suspicion of being affected with tuberculosis, of which 810 were found to be tuberculous by means of the tuberculin test and killed; 1432 head were tested at Brighton, of which 89, or 6.21 per cent., were killed and found tuberculous, but there were also 21 killed in which no lesions were found. There were 665 tested on Nantucket; only 6 reacted, and the lesions in some of these were so slight as to be questionable. During 1895 the personnel of the commission remained as it was in October, 1894, after the appointment of Mr. Dennen, and the policy adopted the previous autumn continued unchanged in most respects. The payment of half compensation for tuberculous neat cattle destroyed was found to be unsatisfactory to the farmers, and the law was changed to allow the full appraised value for each animal killed, not exceeding sixty dollars for any one creature, provided the condemned animal had been owned in the commonwealth for six consecutive months prior to the date of condemnation.

The cattle commission continued to test all cattle brought to Brighton, Watertown, and Somerville stockyards from without the State, and also all Massachusetts cattle offered for sale at these markets except beeves for immediate slaughter, calves under six months old, and cattle intended for export, until April 30th, when the work was relinquished for lack of funds.

In July an order was adopted that cattle could be brought in from without the State on permits issued by the Board, except to the stockyards at Brighton, Watertown, and Somerville, where they could be brought without permits, as these yards were considered quarantine stations, and cattle accompanied by satisfactory certificates of tuberculin test, made by veterinarians in other States, approved by the Board, were released. This method continued for several years, and soon became a farce and fraud upon the public, as much of the work was done dishonestly, to please the cattle-dealers, particularly for the drovers attending the weekly market for milch-cows at Brighton. The systematic testing of herds started in Nantucket the previous year was continued, and completed in Dukes (the island of Martha's

Vineyard) and Barnstable Counties, including 2856 animals, of which 9 reacted to tuberculin and were killed and found to be tuberculous. In addition, 795 head were condemned as tuberculous that were quarantined by the local inspectors. The cattle commission continued in 1896 as organized in October, 1894, with Dr. Osgood as chairman and Dr. Lyman as secretary, until October.

The commission's position on tuberculosis was very radical and expensive. The inspectors of animals during the first half of the year, before an appropriation was made for the year's work, continued to quarantine cattle on suspicion of having tuberculosis, and the law provided that after ten days from the date each animal was quarantined the State should assume the expense, and the commission would not kill any until an appropriation was made. The result was that when the legislature made an appropriation early in June, there were 1043 head of neat cattle in quarantine upon which the State owed a board bill of $28,223.43—nearly as much as the appraised value of the animals in quarantine.

The avowed intention of the Board of Cattle Commissioners to enforce a compulsory tuberculin test of all the neat cattle in the State aroused a great deal of opposition among the farmers. Tuberculin was a new agent, and as such could not be forced upon cattle-owners until more was known about it by them, as many statements were in circulation concerning injurious effects produced by it, such as causing tuberculosis in healthy cattle, abortion, and the like; furthermore, many owners of cattle were unable to comprehend that an animal with a nodule or two in a bronchial or mediastinal gland was a source of danger to other cattle or to human life, or that the flesh of such an animal was unhealthful for human food. As the result of this opposition Dr. John M. Parker, of Haverhill, was appointed a member of the Board by Governor Wolcott, at the expiration of Dr. Lyman's term of office in October, 1896.

In December Dr. F. H. Osgood resigned and Dr. Austin Peters, of Boston, was appointed to fill the vacancy, and elected chairman, with Dr. Parker as secretary. The excitement over bovine tuberculosis reached high-water mark in 1896, when the legislature appropriated $300,000 for the use of the cattle commission. Early in the winter of 1897 an appropriation of $250,000 was secured for the eradication of contagious diseases among animals. During the spring of 1897 many farmers in Middlesex County had their herds tested by veterinarians at their own expense, and the veterinarians reported reacting animals to the cattle commissioners, who had the animals appraised and killed, leading to a raid on the appropriation by tests on cattle over which the Board had no control.

Another extravagant feature of the law then in force was that animals killed as diseased were deemed unfit for food, and hundreds of animals were

thrown into the rendering tank and made into fertilizer, which under an intelligent system of meat inspection might have been passed as fit for beef.

The farmers who had the testing done in most cases had no interest in an attempt to diminish the amount of bovine tuberculosis in the State, but simply did it as a matter of speculation, with the idea of selling a lot of old milked-out cows to the commonwealth for more than they were worth. In this they were disappointed to a certain extent, as more cows reacted than the owners expected, and also in many instances the best ones, so as to almost wipe out entire herds. This condition of affairs attracted the attention of certain members of the legislature, resulting in the appointment of a special joint committee April 9, 1897, to investigate the work of the cattle commission, with power to employ experts to make autopsies on the cattle from certain herds in Dracut, condemned after private tests made by veterinarians, the committee to report to the legislature later.

The committee selected as experts to make autopsies on condemned cattle, and also the few remaining non-reacting cattle in certain herds, was: Harold C. Ernst, M.D., of Boston; Theobald Smith, M.D., of Boston; Geo. N. Kinnell, M.R.C.V.S., of Pittsfield; Dr. Frank Billings, of Grafton, a graduate of a German veterinary school, and Charles R. Wood, Veterinary Surgeon, of Lowell. Each wrote an independent report.

The legislative committee from the Senate and House reported May 25, 1897. There were two reports, one signed by most of the members, and a minority report signed by two members of the House. The majority report favored more conservative methods, and stated that the cattle commission should pay more attention to disinfecting barns and stables where tuberculous animals had been kept, immediately upon their removal, and before new animals were introduced. The majority report continued as follows:

"From our observations at the investigation we hold that the Board of Cattle Commissioners should at once take into consideration modifications of the law relative to the condemnation of cattle by tuberculin test alone, that is, upon the request of owners of cattle for such testing of their herds. If cattle are to be condemned or regarded as suspicious animals only after they show signs of disease, it is a question as to the propriety or equity of the State paying full value for those that are actually diseased. This proposition we respectfully refer to the consideration of the next General Court, trusting that the Board of Cattle Commissioners will, in the mean time, consider the same question and offer recommendations in their annual report.

"We believe that the legislature should at once deal with the matter of indiscriminate tuberculin tests. We recommend that all testing of cattle with tuberculin when compensation is expected be limited to the cattle commissioners or their authorized agents. The Board of Cattle Commissioners have already expended more than $160,000 of the total appropriation of $250,000 made earlier in the session. If they are compelled to kill all reacting animals and allow full compensation for the diseased cattle, the remainder of the appropriation will soon be exhausted. There will then be no

money for the prosecution of the regular work of the commission or the slaughter of those animals reported by the local inspectors as suspicious cases, and which are really the most dangerous animals to the health and comfort of the general public. The commissioners are not allowed to exceed their appropriation, hence all their work must stop when their money gives out.

"We earnestly recommend the immediate passage of the following act:

"COMMONWEALTH OF MASSACHUSETTS.

"In the Year One Thousand Eight Hundred and Ninety-seven.

"AN ACT

"Relative to the Payment of Compensation from the State Treasury on "Account of Cattle Infected with Tuberculosis.

"*Be it enacted by the Senate and House of Representatives in General Court assembled, and by the authority of the same, as follows:*

"SECTION 1. No person or persons having animals tested with tuberculin shall be entitled to compensation from the State for any animals that react to the tuberculin test unless such testing be done by the State Board of Cattle Commissioners or their authorized agents acting as such at the time of the test, and such testing must be subject to the supervision and control of the State Board of Cattle Commissioners.

"SECT. 2. This act shall take effect upon its passage.

"We submit with this report the reports made by the experts attending the post-mortem examinations of these cattle."

The above proposed legislation was immediately acted upon, and became law June 10, 1897, insuring a complete control in the future to the cattle commission of its appropriations. The legislature had already, earlier in the season, passed an act restricting the use of tuberculin, which provided as follows:

"The use of tuberculin as a diagnostic agent for the detection of the disease known as tuberculosis in domestic animals shall be restricted to cattle brought into the commonwealth from any point without its limits, and to all cattle at Brighton, Watertown, and Somerville; provided, however, that tuberculin may be used as such diagnostic agent on any animal or animals in any other portion of the State upon the consent in writing of the owner or person in possession thereof, and upon any animals condemned as tuberculous upon a physical examination by a competent veterinarian." (*Approved March 15, 1897.*)

This clause in the law was first enacted in April, 1896, to continue in force until June 1, 1897, but in March, 1897, it was made permanent upon the statute-book. This was due to the opposition of the farmers to the unrestricted compulsory use of tuberculin by the cattle commission.

The minority report of the committee favored continued radical action, and considered that if the cattle commissioners had made mistakes, the fault was with them and not with the law.

In 1898 the legislature gave the cattle commissioners "power to make and issue rules and regulations for the guidance of inspectors of animals and provisions in the inspection of meat, which shall conform with the rules and regulations of the United States Bureau of Animal Industry for the inspection of meat for export and for interstate commerce." (*Approved May 23, 1898.*) This put an end to the folly and extravagance of making fertilizer out of meat fit for food. In 1898 only $20,000 was appropriated for the use of the cattle commission. Governor Wolcott called the attention of the legislature to the fact that this appropriation was insufficient to carry out existing laws; the House then voted to abolish the cattle commission, in which the Senate refused to concur. The governor then again wrote the legislature a message recommending a further appropriation; the House again voted to abolish the cattle commission; the Senate again stood by it. The commissioners decided to do what they could as individuals during the remainder of the year, and in this way examined and caused to be killed glandered horses, and kept up the quarantine against out-of-the-State cattle, requiring all those brought in to have certificates of tuberculin tests, except beeves for immediate slaughter or calves under six months old. The legislature of 1899 passed a deficiency appropriation bill sufficient to pay the members of the commission the arrears in their salaries.

The legislature of 1899 also passed an act recodifying the laws relating to contagious animal diseases, reducing the cattle commission from five members to three, and giving it an appropriation of $75,000 for the current year. The limit of value on a bovine with tuberculosis was reduced from $60 to $40, and the law providing for the annual appointment of inspectors of animals and provisions by the various cities and towns of the State was changed to provide for the annual appointment of inspectors of animals. The inspection of live animals at the time of slaughter and provisions was turned over to the local boards of health, the inspectors of animals only having to inspect live animals for contagious diseases, quarantine suspected cases, and make a general inspection of farm animals and premises where they are kept when ordered to do so by the cattle commission.* This act was approved May 25, 1899, and Governor Wolcott appointed Charles A. Dennen, Leander F. Herrick, and Dr. Austin Peters members of the Board.

The commission continued thus until 1902, when, at the suggestion of Governor W. Murray Crane, who thought that the State had too many commissions, the legislature abolished the Board of Cattle Commissioners and established in its stead a Cattle Bureau of the State Board of Agriculture, with a chief appointed annually by the governor with the advice and consent of the Honorable Executive Council, who, by virtue of his office, shall be a member of the State Board of Agriculture. The governor then appointed

*This inspection has been ordered annually in the autumn since 1899.

Dr. Austin Peters chief of the Cattle Bureau. As there is no one in the Cattle Bureau except the chief who has the powers and duties formerly vested in the cattle commission, it practically replaces a commission of three with a single commissioner. This arrangement has remained in force since April, 1902, up to the present time.

During the winter of 1902 and 1903 the market at Brighton was closed because of an outbreak of foot-and-mouth disease, but since it was reopened in July of the latter year all out-of-the-State cattle brought to Brighton, Watertown, and Somerville for the weekly market upon which a test is required have been tested by the agent of the Cattle Bureau in charge of these yards, and his assistants, as it was found that much of the testing outside of the State, which was done by the veterinarians for the drovers, was not honestly performed, and the certificates in many instances were of no value. About 13,000 or 14,000 cattle, chiefly milch-cows, are tested at the Brighton barn each year, and reacting animals—about 200 usually—are killed. Recently it has been decided not to accept any certificates of test from veterinarians outside of the State on cattle coming in on permits to points outside of the stock-yards at Brighton, Watertown, and Somerville, but to have all cattle upon which a test is required tested after arrival at their destinations by agents of the Cattle Bureau. These tests are made free of charge to citizens of Massachusetts, and at cost to others, as required by Chapter 322 of the Acts of 1903.

The following shows the amounts appropriated for the use of the cattle commission or Cattle Bureau since 1895, and the number of cattle killed:

Year.	Amount Appropriated.	Number of Cattle Killed	Amount Paid for Cattle.
1896	$300,000.00	5,748	$182,216.60
1897	250,000.00	5,529	188,534.00
1898	20,000.00	297	8,057.61
1899	75,000.00	785	17,277.69
1900	50,000.00	1,423	30,870.22
1901	50,000.00	1,341	27,424.50
and a deficit appropriation	3,408.11		
1902	58,000.00	1,001	21,137.75
1903	73,000.00	1,843	42,454.32
and a deficit appropriation	4,500.00		
additional appropriation foot-and-mouth disease	40,000.00		
1904	65,000.00	1,658	35,456.45
and a deficit appropriation	9,500.00		
1905	67,000.00	1,625	34,133.58
and a deficit appropriation	5,000.00		
1906	66,416.66	1,737	35,952.75
and a deficit appropriation	11,560.24		
1907	77,000.00	2,030	42,326.60
and a deficit appropriation	8,432.60		
Totals	$1,233,817.61	25,017	$672,842.07

It will be seen by the foregoing table that for the twelve years ending December 1, 1907, the State of Massachusetts has appropriated the sum of $1,233,817.61 for the eradication and control of contagious diseases among domestic animals, and that a large item of expense is the cost of paying owners of tuberculous animals for neat cattle slaughtered by the State authority as suffering from this disease. During twelve years 25,017 head of tuberculous cattle have been killed, for which the State has paid $672,842.07—an average of $26.89 per head.

It is also shown how the pendulum has swung one way and then the other; that in 1896 the limit was reached when $300,000.00 was appropriated, and in two years the legislature went to the other extreme and appropriated but $20,000.00; and that the House then voted to abolish the cattle commission; how later an even keel was reached, and since then the appropriation has ranged from $50,000 to $75,000 per year. The combined appropriations for the years 1896 and 1897 were nearly half of the sum of the appropriations for the twelve years, and $377,750.60 was paid for 11,277 diseased cattle in 1896 and 1897, which is more than half of the sum total paid for 25,017 head.

The average price paid per head for condemned animals in 1897 was a little over $34, which was the maximum average price per head reached; since then it has been diminished, until the last few years the average price paid per animal has been between $20 and $21. The reason for the high prices paid in 1896 and 1897 was due to the fact that all animals quarantined by the local inspectors and many large herds were tested with tuberculin, and all reacting animals killed, no matter how slightly diseased they might be, and many of these animals were apparently in good physical condition, while at the present time very little herd testing is being done; as a rule, only animals that show marked physical evidence of disease, or that have nodulated udders, are killed, and nearly all are condemned on a physical examination. In 1896 and 1897 there must have been, counting private tests, fully 10,000 head of cattle tested with tuberculin in each year, over half of which reacted and were killed and found to be diseased.

At present herd tests are made only on the following conditions: that is, they are made with the understanding that reacting animals are to be killed if the owner will agree to accept what the butcher will allow for those that are so slightly diseased as to pass as fit for beef, the State to pay for those that are so badly diseased as to have to be rendered, the State furnishing the agent to do the testing and the tuberculin free of charge to the owner of the herd. The owner also further agrees to purchase only tested animals in the future, and to cleanse and disinfect his stables in accordance with the rules and regulations of the Cattle Bureau. This puts part of the burden of expense on the owner of the herd, and a farmer does not care to request to have his herd tested unless he is thoroughly in earnest in his desire to eradicate the disease

from his premises. In 1907 only 16 herds were tested at the request of owners, comprising 454 animals. Three hundred of these failed to react. and 126 passed for beef to the credit of the owner, the State not having to pay for them. Only 26 were so badly diseased as to have to be rendered. Two reacting animals were held in quarantine for further observation.

The present methods give the State a tolerably good system of dairy inspection as far as the public health is endangered from the milk of tuberculous cows in Massachusetts, but it does not protect them from the milk of tuberculous cows in Maine, New Hampshire, Vermont, Connecticut, or New York State.

It is doubtful if the work at present being carried on against bovine tuberculosis in Massachusetts accomplishes much in the direction of decreasing the percentage of tuberculosis among the herds of the State, as a fresh crop of badly diseased cattle, mostly cows, is harvested year after year; if anything, it would appear that there is a slight increase, as the number of condemned cattle has gradually increased a little, varying somewhat from year to year, from 1423 in 1900 to 2030 in 1907. To do more work and gain greater headway larger annual appropriations for the use of the Cattle Bureau will be needed; the greatest possible amount of work is being done with the means available at the present time. If public opinion demands more than is at present being done, there is no doubt but that the appropriations will be increased so as to allow more active and extensive measures being adopted for the eradication and control of bovine tuberculosis than are at present in force, but it is not at all likely that the commonwealth of Massachusetts will ever return to annual appropriations for this purpose of from $250,000 to $300,000.

At the present time we are hearing a great deal about the new era in medicine, and the great field of preventive or State medicine; while it is new to many, it is not so new to us; the veterinary profession had a very good conception of preventive medicine and of sanitary science and police at a time when the practice of medicine to the minds of many consisted only in going into a sick-room, looking wise, making a diagnosis, and writing a prescription. Veterinarians can point with pride to the fact that they are the pioneers who have blazed the path through the wilderness, built the roads, and constructed the bridges over which the main army is now so eagerly rushing into the field in which "medicine is coming to her kingdom."

Histoire de l'Agitation contre la Tuberculose bovine dans l'Etat de Massachusetts; Législation qui en est résultée, et Leçons que l'on peut tirer des efforts faits par l'Etat pour l'extirper et la controler.—(PETERS.)

Cette étude traite du début de l'agitation dans l'Etat de Massachusetts contre la tuberculose bovine; la première tentative fut une série de confér-

ences faites en 1880 par le docteur Noah Cressy, qui habitait alors à Amherst, Mass. Il fit ces conférences à l'Institut des Agriculteurs, empruntant les idées évidemment en grande partie de l'ouvrage de Walley "Quatre fléaux de l'espèce bovine." L'étude donne un compte-rendu des efforts du Dr. Winchester en sa qualité de membre de la Commission du Bétail, pour faire reconnaître la tuberculose bovine par les lois de l'Etat, ce qui fut fait plus tard après la découverte du bacille tuberculeux par Koch. Elle contient aussi un court résumé du travail exécuté par le Docteur H. C. Ernst et moi, sous les auspices de la Société de Massachusetts pour l'Avancement de l'Agriculture; le rapport du Dr. Ernst à cette Société, et les démarches de la Société qui attira l'attention de la Législature de l'Etat sur cette question en 1891; le fait que la tuberculose chez les animaux fut reconnue comme maladie contagieuse par un acte législatif de l'Etat de Massachusetts en 1892; et enfin l'histoire des travaux de la Commission du Bétail et du successeur de la dite Commission, le Bureau du Bétail, dans ses efforts pour diminuer et contrôler cette maladie, de 1892 jusqu'aux temps présents.

Geschichte der Agitation gegen die Rindertuberkulose in Massachusetts, daraus erfolgende Rechtsgebung, und Lehren, die man von den Versuchen des Staates in Bezug auf ihre Ausrottung und Kontrolle ziehen kann.—(PETERS.)

Dieser Artikel erörtert die frühzeitige Agitation in Massachusetts gegen die Rindertuberkulose, wobei das Erste eine Reihe von Vorlesungen im Jahre 1880 bei Dr. Noah Cressy war, welcher damals ein Bewohner von Amherst, Mass., war. Er hielt die Vorlesungen in dem Farmer-Institut, wobei er offenbar die meisten seiner Ideen von Walley's "Four Bovine Scourges" nahm. Der Artikel giebt dann einen Bericht von Dr. Winchester's Bemühungen als ein Mitglied der Rinderkommission, die Anerkennung der Rindertuberkulose durch Staatsgesetze zu sichern, welches später und nach der Entdeckung des Tuberkelbazillus durch Koch geschah. Er giebt auch ein kurzes Résumé der Arbeit geleitet unter den Auspizien der Massachusetts Gesellschaft für Förderung der Landwirtschaft durch Dr. H. C. Ernst und den Verfasser; Dr. Ernst's Bericht an die Gesellschaft und die Aktion der Gesellschaft, die Aufmerksamkeit der Staats-Legislatur auf diese Angelegenheit im Jahre 1891 zu lenken; Anerkennung der Tuberkulose unter den Tieren als eine ansteckende Krankheit durch die Gesetzgebung des Staates Massachusetts im Jahre 1892, und eine Geschichte der Arbeit der Rinderkommission und ihres Nachfolgers, des Rinder-Bureau, in den Bestrebungen für ihre Verminderung und Kontrolle von 1892 bis zur Gegenwart.

THE USE OF TUBERCULIN IN CONTROLLING TUBERCULOSIS IN HERDS.

By C. J. Marshall, V.M.D.,
Philadelphia.

There is an increasing desire on the part of breeders and dairymen to get and to maintain herds free from tuberculosis. Consumers, physicians, and veterinarians are also interested in this subject. By good luck or good management many herds have never been infected with tuberculosis. Even more care and better judgment may have been exercised in guarding herds that have become infected.

Tuberculosis may be detected in the advanced stages by a physical examination. The physical diagnosis depends upon the stage to which the disease has progressed, its location, and the cleverness of the observer. No pathognomonic symptoms are known by which the disease can be diagnosed in its incipiency, and there is no case recorded of a herd that has been infected with the disease and made free from it where the diagnosis has depended on a physical examination alone.

Ability to recognize the physical symptoms is an absolutely necessary qualification of the veterinarian, but by this means alone we have never been able to detect all cases and we may never hope to do so. In tuberculin we have an agent that will show the disease in all cases to within a very small percentage. Tuberculin has been used and its action has been critically studied for the past eighteen years. We have yet to find one case where tuberculin has injured or has produced any ill effects in a healthy animal, when properly used. There is no doubt, in the minds of those who have studied it most critically and used it most extensively, of its reliability and harmlessness. It has been criticized for its abuse, not its use.

Tuberculin is but one link in the chain that is used to eliminate tuberculosis from a herd. When its judicious use is combined with the necessary isolation of reacting animals, thorough disinfection, ventilation, and proper sanitation, its value cannot be gainsaid. We have a very large number of examples to show what it will do in controlling tuberculosis when accompanied by other measures for its suppression.

Seeing is believing with many people, and many cannot understand that a disease exists till they can see its external effects or experience losses from

it. Unfortunately, in the case of this disease, much of the damage has been done before there is ocular evidence of its presence.

The true cause of tuberculosis of cattle is no more a mystery; its presence can be detected at an early stage. Its contagious nature has been established beyond all doubt. The disease can be caused in no other way than by the tubercle bacillus, and outside of the animal body it may retain its vitality and virulence for a long time. Agents for destroying the tubercle bacillus outside of the animal body are well known and can be applied practically. For these reasons the task of eradicating it is not impossible. It is, however, difficult in some cases.

We realize more and more that tuberculin is a safe, reliable test when honestly and intelligently used. There is no doubt but that its use should be restricted to those who are competent and skilled in its use, as well as in the diseases of animals, who possess good judgment and are as truthful as tuberculin is itself. There is no better means for defeating the value of this test than to allow it to become a household remedy. Any intelligent person can soon learn to use a hypodermic needle and a thermometer. There are other things about the tuberculin test that are more complicated, and at times men the most skilled in its use are put to their wits' end to know how to handle peculiar questions that arise in connection with this subject. It would be as easy, and far safer for the community, to try to teach the average farmer to be his own blacksmith, wagon-builder, lawyer, physician, etc., as to instruct him to do his own testing for tuberculosis. We need more persons who are skilled in the use of tuberculin and in the control of diseases of animals in general. The States or governments should spare no effort in training men as thoroughly for this work as the importance of the subject requires.

The time may not be ripe for legislation to attempt the compulsory eradication of tuberculosis from all herds, but many individuals have discovered that the disease can be controlled, and that it is more economical to do this than to let it run its natural course. The State should at least furnish such men the necessary assistance. With our better class of breeders and dairymen this idea is spreading. The demand for meat and milk from tuberculosis-free herds is helping to bring about this desirable condition of affairs. Medical milk commissions require a tuberculin test once yearly, at least. There is no other known means of ascertaining whether a herd is free from tuberculosis.

The transmissibility of the disease from animals to man is an important question, but it is certain that this disease is transmitted from animal to animal, and those interested in dairy cattle cannot afford to allow it to run unchecked in a herd.

It will be a difficult matter to convince the masses of the fully estab-

lished harmlessness and the usefulness of tuberculin so long as some agricultural and daily papers continue to malign its use. It is hoped that these agencies will soon see the facts in their true light and recommend the truthfulness and good qualities of tuberculin rather than continually to condemn it and to herald the mistakes and blunders that are made by those who are incompetent to use it.

Even those most enthusiastic in the campaign against bovine tuberculosis do not recommend the immediate slaughter of all animals that react to the test. No country, perhaps, could afford such extravagance. There is no doubt but that a majority of the animals that fail to pass this test have a monetary value. The sooner public opinion is educated to this fact, and that the products of such animals can be handled in such a way that their safety can be assured, the sooner will ways be devised to use them profitably, and thereby encourage the cutting off of the main sources of infection.

A sufficient amount of knowledge has already been accumulated in reference to this disease to eliminate it from our herds in a few years if all parties concerned were in possession of the already known facts, and could and would make the necessary effort and sacrifice to apply them. The first necessary requisite would be a thorough knowledge of the disease on the part of the owner, and his willingness to accept and follow the known facts in reference to handling it. No person should undertake this task unless he is willing and able to follow every requirement faithfully. Testing the herd once and cleaning the stable of all known sources of infection is a good beginning, but these measures must be followed year after year till the task is completed. This is especially true in herds where cows are constantly being added from the open market.

It has been found by experience that some cows will pass a satisfactory test at the time of purchase and react to a subsequent test in two months or less. This may be due to one of several conditions. First of all, the test may have been made carelessly or dishonestly, the tuberculin may have been inert, or the animal may have been in the incubative stage of the disease at the time of purchase, and therefore fail to react. It is known that there is a period of incubation for tuberculosis of from eight to fifty days. It is also known that animals will not react to a test during this period. Another possible cause for a reaction soon after purchase is the fact that the stable may not have been disinfected before the new members were added to the herd, and thus they may have contracted the disease in their new quarters. Some animals have a much higher resisting power to this disease than others; this is especially noticeable in the new members of a herd.

It has been demonstrated that it is not safe to put newly purchased

cows with the old members of a herd till they have first successfully passed a retest. This can be applied two or three months from the time of the original test, and a double dose of tuberculin should be used. Cows from tuberculous herds or from herds tested by the owners may develop the disease in the future, even though they be removed to a sanitary stable after having passed a satisfactory test. For this reason it is not advisable to purchase cows from herds that are known to be highly tuberculous, even though they pass the test successfully. The lesion of disease may become dormant for a time and the diseased area encapsulated, but later it may break down, when the proper conditions are supplied.

In large dairy herds where cows are being added to take the place of undesirable ones, it is a difficult matter to keep the disease out entirely. It can be kept within bounds, and in a form that will seldom show itself physically. The chances are very great that the herd has tuberculosis where the tuberculin test is used only at the time of purchase.

In cases where many reactions are found at the time of test, a retest should be made within six months. If the percentage of reactions is not more than from two to five, and the sanitary conditions are good, the retest can safely be left for a year. In large herds the test should be made at least once a year, even though it has previously passed with no reactions.

The records show hundreds of cows that have been tested at least once each year, and sometimes twice, for several years, and are still breeding regularly, giving a full and profitable amount of milk, and are in perfect health, so far as can be determined by any known method. It is a question as to whether a cow that reacts once to the test should ever be considered free from tuberculosis, even though it may appear healthy, and later pass the tuberculin test.

Some of the most common errors made with tuberculin are due to carelessness or dishonesty. The test may be applied when the animals are in no condition for it. This is especially true in cows offered for sale by dealers. Such animals may be heavy springers, fatigued and overheated by being driven from ten to twenty miles in the heat of the sun, and then kept in a strange stable with no water or an inadequate amount. The weather may be excessively hot and the stable badly ventilated, or an animal may be of a nervous temperament and become unduly excited. Dealers are often anxious to get the animals through the test early in the day, so that they can be shipped or sold, and for this reason the temperature readings are sometimes not carried on long enough after the injection to show the reaction that might take place. The animal may have been injected with tuberculin before an honest test is applied. It happens occasionally that an animal will not react on successive tests where the intervals are less than two months. The test should never be applied unless the animals are quiet, contented, and undisturbed.

In applying the test it is necessary to establish a normal temperature before making the injection. This can usually be done by two preliminary temperatures. The test may not prove satisfactory if the initial temperature is above 103° F. In cases of a high initial temperature, if the temperature is not above normal the next morning, the animal is usually considered to be free from the disease. Where the temperature is high at the beginning, and remains so, it cannot be decided whether the high temperature is a continuation of the preëxisting fever or is a reaction to tuberculin. It is best, by all means, to start with a normal initial temperature.

A temperature measurement should be taken not later than ten hours after injection; eight hours is preferable, and in cases of retest it should be earlier than eight hours. The last temperature should be taken not earlier than the sixteenth hour, but it must be followed longer if there is any upward tendency and a reaction is not already established.

The point at which a reaction is considered positive is a relative quantity. A temperature that rises gradually from the eighth to the sixteenth hour from 102° to 104° or above, under ordinary conditions, can be considered a positive reaction. In well-marked reactions the temperature may rise to 107° or higher. This is more liable to occur in cases of recent infection or where the disease has not become generalized.

In advanced cases of tuberculosis or where the disease is suspected from a physical examination, a rise of one degree should be interpreted as a reaction. In herds where a large number of reactions have been obtained the line may be drawn more closely on doubtful cases. Animals that show a questionable rise in temperature at the time of test should be isolated and retested in about two months. In this case a larger dose of tuberculin should be used. It may be advisable to use three or four doses at one time.

During the time of testing, the herd should be fed, watered, milked, and stabled as usual. Water can safely be given soon after a temperature has been taken, but it should not be allowed freely just before a temperature measurement. In stables where there is a constant water-supply there is no danger of the animals taking enough to interfere with the temperature. Tests in hot, sultry weather may not be satisfactory. So far as possible, it should be arranged to do the testing in the cooler parts of the season.

Advanced stages of pregnancy seem to make little, if any, difference with the test. Many successful tests have been made during the day of parturition.

The utmost care should be exercised in sterilizing thermometers, needles, syringes, hands, clothing, etc., before and during the time of making a test. Contagious abortion, tuberculosis, and other contagious diseases may be carried from animal to animal or from herd to herd if this precaution is not taken

For those who are in sympathy with the work, the plan for handling tuberculosis is somewhat as follows: In herds where no animals are purchased, or but few, the tuberculin test is applied, the reacting animals are isolated, and the stable disinfected. If a large percentage of the herd fails to pass the test, the above measures should be resorted to again in six months. Where but few reactions are found, the retest can be deferred for one year. It is not safe to allow more than one year to elapse before making the retest, which should be repeated yearly.

In herds where animals are purchased frequently, the test should be applied at the time of purchase by a veterinarian approved by the purchaser. Animals thus tested and passed should be kept on probation for two months and retested before they are allowed to mingle with the older members of the herd. The stable in which these animals pass the period of probation should be carefully disinfected before they are admitted to it. The test of the herd should be applied at least once each year. In cases where many reactions are found, the test should be made every six months until a low percentage is obtained. It is not advisable to test too frequently. The repeated use of tuberculin may produce immunity to the test. Cases that do not react to a retest are exceptional.

The sale or distribution of tuberculin should be controlled by State laws, and it should be given out only on the order of an official veterinarian. Every animal tested should be reported to some officer who has charge of this work, and the records of such tests should be available for public investigation.

Every effort should be made to disseminate what knowledge has already been accumulated in reference to handling tuberculosis. The disease can never be satisfactorily controlled as long as ignorance and old, false ideas reign supreme.

BOVINE TUBERCULOSIS IN MAINE FOR TWENTY YEARS.

By John M. Deering,
Saco, Maine.

Thirty years ago beef breeds of cattle predominated in Maine, but to-day dairy cows are the more numerous. Those old native-born Durham breeds, mixed more or less with the hardy Devon, were strong in lung and limb, and, being raised in open barns, fed in winter upon only hay, summered in the pastures, acclimated to our severe climate and conditions, they were reared and raised under conditions that would build up a strongly constituted animal, and one that would not be susceptible to tuberculosis. At that time tuberculosis among cattle in Maine was practically unknown. About this time conditions changed, and a revolution in the cattle industry began. It was surprising how quickly those dark-red, high-horned beef breeds disappeared and the fawn-colored Jersey took possession of the hillsides of Maine. The farmers not only changed their breeds, but changed the habitations from open barns to closed tie-ups; they changed the feed from home-grown products to concentrated food-stuffs, never realizing the importance of the health of the animal, and not thinking that they were dealing with a more delicate animal, they aimed only for one point—the almighty dollar.

This change was brought about by the farmer buying foreign, pure-blood bulls of the dairy type to build up his herd, and soon pure-blood breeders were to be found all over the State. Even the State College farm was stocked with fine dairy cattle, and the young were sold to farmers at a much lower rate than they could be bought for elsewhere, and the business prospered for a while, neither the breeders nor the farmers realizing that they were on the road to trouble, in the way of tuberculosis.

Prior to the passage of the cattle commission law, in 1889, one of our State institutions had been breeding pure-blood beef stock; but when the dairy interest commenced to awaken, they were among the first to start in breeding Jerseys. Everything was going along splendidly, when, in 1886, the cattle commission was called upon to investigate this herd. Tuberculosis then was very little known in Maine. Some cases had been diagnosed after the death of the animal, and all animals were condemned by a physical examination. The herd proved to be badly tuberculous,

and during March and April of that year, 52 of them were destroyed and shown conclusively to have been affected. There were many and various opinions as to the advisability of the slaughter. An investigation by the legislature was ordered, and many noted scientific men appeared before the investigating committee, giving their views upon the matter, and the subject was well ventilated. All up and down the State men took sides, either for or against, and many bitter animosities were engendered. Fourteen young bulls were known to have been sold from this herd (if not more), and were scattered over the State for breeding purposes, and the great controversy came over the policy of gathering them in and destroying them, for they came from badly infected mothers, as proved by the post-mortem examinations.

They were not looked after, either from lack of funds or lack of public sentiment. The diseased progeny of these bulls can be traced, with no uncertainty, up to the present time. Wherever one was located, there was a center of disease plainly traceable to him. Men may have honestly differed in opinion at that time as to the policy of slaughter, but no investigator at this time can go into the matter without arriving at the conclusion that it was a mistake not to have gathered them all in and destroyed them.

Shortly after the slaughter of the herd a general law was passed, which law remains on the statute-book to-day, and with some amendments constitutes the law under which the present cattle commission is working.

In the year 1894 I became a member of the cattle commission. This was in the early days of the tuberculin test, and it had never been used in Maine. There was a noted herd of pure-blood Guernseys in the State, and the owner called upon the commissioners to examine the herd, as he was suspicious of tuberculosis among them. It was decided to test them with tuberculin, and of the 30 head, 19 reacted. I was present at the slaughter, and some 50 farmers and others were present, to see what could be seen. It was a critical time, and three times during the day the commissioners were upon the point of stopping the work, on account of the post-mortem examinations not showing up the disease sufficiently extensive to justify the then skeptical opinions. However, the work proceeded and the herd was cleaned up. There was a case that did not react, and consequently was not slaughtered, but it afterward proved to be tuberculous, and was quoted against the commissioners for many a day. This locality has always been one of the worst infected districts in the State.

During the year 1896 the Portland Board of Health passed a by-law that all cows supplying milk for the city should be tested with tuberculin. The measure was fought by the producers, and was finally passed upon by one of the judges of the Supreme Court, who declared the by-law legal;

but the opposition was so strong that the Board of Health finally modified the order to a physical examination, instead of the tuberculin test, with the result that but one animal was turned over to the commissioners as diseased out of 5000 claimed to have been examined by them.

During this year, 1896, the city of Lynn, Mass., also passed a similar law of tuberculin test, and the farmers of Maine who were supplying milk to that city, rather than lose their market, submitted to it. Some 250 cows were tested, and 30 were condemned and destroyed by the commissioners. Several other cities succeeded in getting some 2000 cows tested, and 206 cows were condemned.

This unsuspected state of affairs brought the cattle commission into debt $8400, and this amount was referred to the legislature. The result was that the legislature said that the commission had no right to exceed the appropriations, and voted to abolish the board. However, the vote was reconsidered the next day, on the ground that it was unfair legislation to turn down a State department without an investigation. The issue was fought out, and the commission won, the deficiency was paid, and the appropriation raised from $2500 to $5000 per year.

During the following year only 47 cattle were condemned, and the business was practically at a standstill. The Board of Agriculture and 90 per cent. of the farmers were against the tuberculin test, and in the year 1899 the farmers informed the governor that there must be a change in the membership of the Board of Cattle Commissioners. They said the veterinarian must be removed and a farmer put in his place—one known to be opposed to the tuberculin test. The farmers won, and the governor, when asked why he removed a good veterinarian and appointed a layman in his place, replied, "The farmers sent me a thousand letters and a petition a mile long." Every graduated veterinarian in the State, except one, signed a petition indorsing the farmer and against the veterinarian then on the board, with the result that the present commissioner was appointed, with the full knowledge that he was opposed to the policy of tuberculin test and in sympathy with the farmer, who demanded less killing and supervision. Nevertheless this same commissioner is to-day one of the best exponents of the policy of slaughter of diseased animals, whenever and wherever found, and a full believer in the tuberculin test. This simply shows where public sentiment stood in the matter nine years ago. After twelve years of contention, discussion, and strife—that is, from the college herd in 1886 to a lay Board of Cattle Commissioners in 1899—in the legislature and out of it, we arrived at a point where we saw our pure-blood herds dwindling, some of our best breeders going out of the business discouraged, our dairy industry with ruin looking it in the face. In view of these facts the dairymen of Maine took the matter into their own hands,

and for nine years have conducted the business in their own way, and there has not been a complaint, from boards of health or private individual, that has not received attention, in a spirit of fairness to both the producer and the consumer.

Now, what have we done, and how have we done it? By arbitrary methods? No. It has been done along conservative and educational lines. The first step after organizing the new board, June, 1899, was to issue new rules and regulations, open a set of books, and advertise a square deal. By the terms of the general law passed in 1889 any rule or regulation which the cattle commission sees fit to make, provided they can get the governor to indorse it, has the full force and effect of the general law, and under this provision the commission has issued all of the regulations from which we are to-day deriving the greatest benefits.

All cattle brought into Maine from other States must be tested with tuberculin within thirty days of arrival, regardless of any other test made. Cattle condemned under this rule are not paid for; they are at the owner's risk. Cattle that have been in the State three years are paid for upon the basis of health. The limit of appraisals on grade cattle is fixed at $50, and on pure bloods at $100, the owner recovering one-half of the appraised value. All cattle are assigned to the State when the appraisals are made.

By far the most valuable part of the law is an amendment made in 1905, making it unlawful for owners of pure-blood animals to pass ownership of the same without their being tested with tuberculin under the direction of the cattle commission. Under this law it was necessary to send a veterinarian to test pure-bloods every time a change of ownership took place, and the commission, to do away with the continual running which this necessitated, entered into an agreement with the pure-blood breeders to test out the entire herd every year, and during the year to grant certificates of health when demanded by the terms of the law. Under this agreement, during the year 1905, practically all of the pure-blood herds of the State were tested out, and about 20 per cent. of them were found diseased. In 1906, 1907, and 1908 this same testing was done, with the result that the pure-blood herds of Maine are practically free from tuberculosis. The herds tested are fully so, and will be kept so; but some few breeders have not availed themselves of this provision, and their stock does not pass current in the State.

Some herds were entirely wiped out and some badly reduced on the first test. The second test showed, in most cases, a clean bill of health; and the third test, a continuation of the same, so that breeders have taken on new confidence, and business is becoming more and more prosperous every year. This law has been our salvation, as it commenced at the right end, because the pure-blood cattle were responsible for the trouble getting into the grade

herds. This pure-blood testing is done at the expense of the State, as is all other testing where the result is a condemnation. Any person has a right to demand of the commissioner an examination of their stock, with this proviso: that if it turns out not to be diseased, they must pay the bill. If diseased, the State will foot the bill. The expense consists of the veterinarian's bill for testing and his expenses.

One of the first things that the commission undertook to do was to get the coöperation of the Maine Veterinary Medical Association. There had been a veterinarian on the Board of Cattle Commissioners previous to this time, and many jealousies and personal feelings had crept in, having much to do with destroying the usefulness of the Board. We met them at one of their meetings and explained that while the law gave us the power to appoint agents, we did not propose to do so; but that we were to throw the work open to all veterinarians equally, and no favors. If one of them found a case of tuberculosis in his practice, it was his case, and he should be paid for services rendered. This proposition was satisfactory to the members, and has continued so ever since. We said to the farmers and breeders, "Take your choice of the veterinarians when you want any testing done," and, as a rule, they selected the best. This method has so shaped itself that at the present time the best men are doing most of the work, and confidence has been restored between the farmer and the veterinarian, and the old-time prejudice has passed away.

About this time a new Commissioner of Agriculture was appointed, and he being a farmer and dairyman, we were not slow about soliciting his goodwill and coöperation. We urged upon him the necessity of carrying along the work in the farmers' institutes, covering hygiene and sanitary conditions, and this has been done in a very satisfactory manner.

When the heads of the different State departments saw that the policy of the commission was working out successfully, they were more than glad to coöperate and assist us in carrying along a line of work in the way of increasing appropriations and strengthening public sentiment, and it is very gratifying to be able to report that we have the coöperation of the Commissioner of Agriculture, the State Board of Health, the State Dairymen's Association, the Creamery Association, and I might say all the departments, and we are all working together in harmony. Coming down to a later date (1906), the Portland Board of Health again enforced the by-law demanding the tuberculin test from every producer of milk and cream for that market. The commissioners coöperated with them as far as the law would allow, and after considerable discussion the test was made upon about 6000 cows, and about 6 per cent. proved to be diseased. The following year (1907) the same herds were tested, and less than 3 per cent. were found diseased. The present year (1908) the test is now being made, but the final result is not obtainable, but we think now that it will fall below 2 per cent.

The testing of the pure-blood herds has been carried along for three years, the first test showing 20 per cent. diseased, the second showing less, and the year 1908 showing less than 5 per cent. Other cities and localities in the State have passed by-laws similar to Portland, and have had their herds tested, and within the last year 20,000 cattle have been tested, and the result is that about 4 per cent. have been condemned.

Do we believe in the tuberculin test? Yes. Is tuberculin infallible? No; neither is anything else made by man. We believe it to be the best agency known to human science to diagnose a case of tuberculosis. Tuberculous cattle are not all sick. We test cattle in Maine to get rid of the diseased ones, for the dairymen do not want them in their herds. They know by actual experience that the longer tuberculosis remains in a herd, the more of it there will be, and that, as a matter of dollars and cents, it is not profitable.

I will speak of only one herd, consisting of 175 head. Eight years before it was destroyed it was tested, and 25 per cent. reacted. In five years it was retested and 75 per cent. reacted. In three years more it was retested and 100 per cent. reacted, and they were all destroyed. This was told to the commissioners at the time of slaughter, and is only a fair illustration of what is going on in other herds where tuberculosis is allowed to remain. The danger of tuberculosis to the cattle industry alone is sufficient to justify the destruction of every tuberculous animal. The most important question now agitating the minds of cattle-owners throughout the country is whether it is profitable and practical to destroy all reacting animals, especially those that do not show physical evidence of the disease. Some States do not destroy unless the physical evidence warrants it, and that policy is causing more or less trouble in the States that do not discriminate.

In Maine we have never discriminated, because with us we have been unable to sell the animal or its product; neither do I believe that the people of any other State or community would willingly buy an animal or its product if the fact of its being tuberculous were known. The only way it can be sold is by secrecy in the matter.

Our law says that the animal must be quarantined or destroyed, and the State, being the highest bidder, gets the animal. An animal that shows physical evidence of tuberculosis is an animal that is dying of the disease. Death and decay are taking place and cannot be stopped. If slaughter is ever to take place, it is high time that it were accomplished, and to my mind it should have been done months before.

At the present time there is but little controversy in Maine about destroying animals that have reacted to the tuberculin test. In practice it has been found that of 100 condemned cattle, there is from 4 per cent. to 5 per cent. that upon our post-mortem examinations will not show evidence of the

disease. Another 10 per cent. to 15 per cent. show only slight evidence of the trouble. The remaining, or 80 per cent., show such conclusive evidence that the most skeptical are satisfied and glad to be rid of the animals. It is with the 5 per cent. of animals that fail to show evidence of the disease on post-mortem examination that the whole fabric of controversy rests. Many farmers knowing little of the theory of the tuberculin test, and practically nothing of tuberculosis in cattle, were apt at first thought to say that a mistake had been made, and in some cases designing persons were more than willing to encourage and foster this belief in their minds.

Ten years ago it was a more common belief than it is to-day. It is now more generally understood that if there is the slightest disease about the animal, it will react under tuberculin. There must be a time when the animal passes from a sound to an unsound condition. Not that it passes directly from a healthy to an utterly diseased one; but just as seed sown in the ground germinates and grows. As daylight passes, who can say just when night begins? The seed of tuberculosis is sown and tuberculin will show it up, whether much or little, and does not need the full-grown plant of luxuriant disease. The germinating seed answers every purpose; but the change may not be distinguishable to the eye; yet who can say (if allowed to know in advance) how soon, or when, this seed can grow to the tree of disease that envelops the whole carcass?

As my work and experience have increased, so has my belief that theory and practice show the truth about tuberculin—that it will demonstrate the presence of tuberculosis, whether much or whether little, with wonderful precision. We used to have some controversy over the cases that only showed slight evidences of the trouble, but we taught the farmers that if they used tuberculin they must submit to its results; that it could not nor would not reveal all cases; but if the animal reacted, it was surely tuberculous, and while a small percentage might show the trouble only slightly, no man could tell what ones they were by the test or the reactions, and that if we undertook to leave any, we were as liable to leave the worst one as any other. Very many animals that have shown physical perfection during life were proved to be badly diseased when destroyed, and I have grown to the belief, more every day, that its physical condition is no evidence of its actual condition.

The cattle commission of the State are in accord in this matter, as their every-day experience is very conclusive on this point. One must believe the evidence of his own senses, and I cannot believe to be true what some one gives as his opinion, when my every-day work shows me the utter fallacy of it. And to my mind physical condition is no guide to go by, and any State, community, or person who takes it for a guide, is following a false light. Neither age nor breed affects the susceptibility of an animal, and I have seen a calf eight weeks old as badly affected as any matured animal.

In eighteen months, through the introduction of a diseased animal (one that did not show the physical evidences of the disease when purchased), a herd of 26 animals that were tested and found sound were infected so that 24 out of 26 were condemned, and all but one plainly showed the disease upon post-mortem examination. This herd was under the very best of hygienic surroundings—all that money could buy or ingenuity could suggest. Very many similar cases I could quote, but if the few will not suffice, the many will not convince.

The question is, Will tuberculosis destroy the cattle industry of the country if allowed to remain in the herds? The experience of the Maine commissioners is that it will, and the records that we keep justify us in no other belief. In herds where tuberculosis was allowed to remain, it swept the whole herd, even when every effort (except the right one) was made to separate the diseased animals and to sterilize the milk for the calves, at an expense of $5000 for a plant, under expert medical guidance, and all for what? A theory, and a poor one for us.

If Maine had followed out the policy of only condemning cattle by a physical examination, she would to-day have a percentage five times greater than she has, and I am glad to say that when the cattle commission report to the next legislature in January, it will be that out of some 25,000 cattle tested with tuberculin, there were only a little over 3½ per cent. found diseased.

The policy of Maine is to get rid of tuberculosis if possible, and we are working by four methods: First, by the tuberculin test. Not because we love it, but because it is the only way at present by which we can clean up a tuberculous herd. Second, by teaching breeders that better sanitary conditions are necessary. Not that good sanitary conditions will cure, but that they will prevent many times. Third, by carrying out a strict system of disinfecting premises where disease has been found, and knowing by experience that simply taking out the diseased animals from a herd does not remove the whole cause, but only so far as that animal is concerned, and we consider it just as important to disinfect the premises as to remove the diseased animal. Fourth, by the use of bovovaccine upon calves. We have now 100 of these young cattle growing up, some coming two years old, and we are watching results carefully in order to demonstrate its value to our cattle industry.

No State will ever be successful in eradicating tuberculosis by a mean cheese-paring policy. In order to be successful, the cattle commissioners must have the coöperation of the owners of the cattle; and in order to get it, we must have a good healthy public sentiment, for without this the work will be a failure. We had no success in Maine until the farmers learned that it was for their interest to clean tuberculosis out of their herds.

We have several large breeders that hold the commissioners responsible for

the keeping of tuberculosis out of their herds, and the pure-blood breeders of the State are in the best and most prosperous condition that they have been in for ten years. The pure-blood law, passed four years ago, has done more in reducing the percentage of disease than all of the work that was done in the ten preceding years, and if the policy is continued (and I feel sure that it will be), at the end of the next five years the cattle industry of Maine will be above and beyond suspicion of tuberculosis.

In conclusion, I wish to say that there are many things that I have left unsaid on account of time; such as proposed new legislation, and the action of the Maine Creamery Association recently taken in regard to having a general test made embracing the whole cattle population of the State. There is a strong sentiment for the latter, and at a recent meeting of the State Board of Health a committee of one from the State Board of Health, State Board of Agriculture, State Dairymen's Association, Maine Creamery Association, Maine Veterinary Medical Association, and Maine Cattle Commission, was appointed to take into consideration what new legislation was necessary, bearing upon public health interests in connection with animal industry.

Within ten years our appropriations have been increased from $2500 to $40,000 per year, and public sentiment has grown from indifference to active coöperation from both private and official sources. We claim no wisdom above others, neither do we criticize the policy of any other State or community in handling tuberculosis, and while we use tuberculin quite freely and adhere strictly to its results, we would hail with joy any other method that would do away with the slaughter of cattle; yet with our small percentage of tuberculosis in Maine, we believe that our policy for us at present, considering our conditions, is working successfully, and that at some future time we shall be able to make a still more favorable report.

THE VALUE OF TUBERCULIN IN THE CONTROL OF TUBERCULOUS HERDS.

By Veranus A. Moore,
Cornell University, Ithaca, N. Y.

The awakening to the fact that tuberculosis existed to any considerable extent in the cattle of America was a result of the discovery of tuberculin by Robert Koch and its later application as a diagnostic agent. A careful inquiry into the extent and distribution of bovine tuberculosis shows that it is most prevalent in those districts where there has been the greatest interchange of cattle. As its dissemination depends largely upon the introduction of infected individuals, it was not strange that with an unrestricted cattle traffic many infected animals were innocently bought and sold, thereby carrying the disease and spreading its virus. The usual slow development of tuberculous lesions in cattle, and the fact that many infected individuals are spreading the bacilli before their true condition is suspected, made it possible for a large number of herds to become extensively diseased as a result of the increase in cattle traffic caused by the constantly growing demand of our large cities for milk.

When the extent of bovine tuberculosis was first ascertained, there was a tendency to radical State control and slaughter of infected animals, because of its supposed sanitary significance. The disease appeared to be one of such magnitude that the people looked to the State for both counsel and financial assistance in its eradication. The State efforts by legislation and official control, however, have not eliminated it as quickly as was generally anticipated. With a growing knowledge of tuberculosis and its parasitic nature, we are coming to realize more and more that it is not so much a matter of State as it is one for the individual to deal with. Like a noxious plant, its seed must be kept out. While the State and nation have their responsibilities concerning it, the individual cattle-owner must in the last analysis see to it that his herd is protected from infection, which usually comes with the purchase of tuberculous cattle or the feeding of milk from tuberculous cows to calves. It is therefore largely a personal problem, the solution of which is to be found in the methods adopted and followed by the individual owner, protected by proper legislation, and given as much other assistance by the State as the legislature may see fit to confer. The burden of the effort to eliminate bovine tuberculosis is with the individual farmers in whose herds the disease

may exist. The work before us is to formulate methods that will enable individual cattle-owners to apply the present knowledge of tuberculosis to the existing conditions in their herds with the least loss and with the quickest returns. It is my purpose, therefore, to discuss the subject of bovine tuberculosis as an individual matter, and to point out the value of tuberculin in this personal conflict with it.

As tuberculin made it possible to determine the presence of tuberculous infection, it is also the one indispensable agent to rely upon in the control of this parasitism. While many of our States have passed laws relative to the use of tuberculin in the official effort to control tuberculosis, a large number of cattle-owners have privately attempted to eradicate it by the same means. In New York I have collected some data on this point. In 1907 I secured the results of the tests made (1904–06) with tuberculin on 683 herds, containing a total of 12,721 animals. Of these, only 262 herds, including 3088 animals, were tested by the State, while 421 herds with 9633 animals had been thus examined by privately employed veterinarians. The practical dairymen have come to recognize the inefficiency of a physical examination and the necessity for some specific reaction to detect tuberculous infection. This has caused the value of tuberculin to be appreciated and employed by a steadily increasing number of cattle-owners.

In using tuberculin certain apparent discrepancies have appeared, which have caused many dairymen to question its value. This is due to the lack of knowledge concerning it. The dairyman does not distinguish between active, healed, or latent tuberculous lesions, and up to a comparatively recent date pathologists have been unable to instruct them in the significance of these technical differences. It is important, however, that the interpretation of the reaction or non-reaction to tuberculin should be clearly understood. The experience of the last few years has called into question certain interpretations and conclusions concerning its accuracy that heretofore were accepted. The findings of Carini, that failure of tuberculin may be expected in about 17 per cent. of cases, and of Lignières, that a tolerance may be established which results in a failure of the tuberculin to give a reaction in certain cases where later post-mortems reveal the presence of tuberculous lesions, have been somewhat general when tuberculin has been applied under certain conditions. The phenomenon of the tuberculin reaction has not been satisfactorily elucidated. The explanation offered some ten years ago by Eber, and recently modified by Smith, will, if correct, do much to clarify the confusion regarding the non-reaction to tuberculin in cases where there are healing tuberculous lesions. According to this theory, for the action of tuberculin, "the tubercle bacilli have induced certain tissue changes, and with them certain new functions of the tissues have been aroused, which are the result of immunization." It is the action of the specific product result-

ing from these changes upon the tuberculin that causes the latter to split off a poisonous substance which causes the elevation of temperature.

A study of tuberculous lesions shows that when the process of healing begins, there is formed about the foci a wall of fibrous or fibrous and cellular tissue, which tends, to a certain degree, to separate the lesion from the surrounding tissue and the circulation. The specific product resulting from the tissue changes as stimulated by the tubercle bacilli in the focus is therefore largely confined to the diseased area, and cannot act upon the tuberculin if it is subsequently injected. This explains the failure of tuberculin to react in those cases where tubercles are healing. As a small part of the specific product of the tubercle may be disseminated in the circulation or surrounding tissues, and as its elimination may be slow, it is not unlikely that the partial reactions that often occur may be explained on the hypothesis that there still remains enough of the specific substance to liberate poison sufficient to disturb the temperature, but not to cause a characteristic rise. More extended investigations are necessary to determine at what stage in the healing process reaction ceases either in part or completely. It is presumable that a number of conditions contribute to this result. In an experiment with 17 tuberculous cows, 12 failed after a certain time to react. The post-mortem examinations revealed lesions that were small and few in number, and in all cases but one they showed evidence of healing. In four of the five cases that reacted quite as much reactionary tissue existed about the tuberculous foci as there was about those in the animals that failed to react. In one the disease was very active and general. In other words, the line of demarcation between the lesions in animals that react and those that fail to do so is not always apparent. Likewise, the failure of the animals to react during the period of incubation, and the reaction that occurs before lesions are in evidence, bring us to another point that must be recognized and explained on the same basis. Because of these limitations of tuberculin, results have been accepted as failures when the conditions were such that the tuberculin could not cause a reaction, or when the reactions have occurred before the lesions were of sufficient size to be readily found, or were localized in organs and tissues not ordinarily examined.

In the application of tuberculin by veterinarians for eradicating tuberculosis in private herds it is very important that the limitations of its action be fully appreciated and explained to the owners. This is desirable in order that the necessary precautions may be taken and the expectations of the owner so adjusted that he will not be disappointed by the future results. The tendency of cattle-men to believe that when an animal fails to react or ceases to react, if it has previously done so, it is perfectly safe to be placed with sound animals, cannot be overcome without duly acquainting them with the facts. If the limitations of tuberculin and the possibilities of infection are

taken into account, the conservative method of dealing with bovine tuberculosis, as first recommended by Professor Bang, has great possibilities. In the State of New York it has been applied in a number of private herds with excellent results. In certain breeding herds it has been the means of saving valuable strains of animals. After separating those that respond at the first test, repeated injections at proper intervals have pointed out the individuals that were infected, but did not respond in the beginning. The breeding from the infected animals has been successful, so that the infected individuals have been replaced by sound ones. The infected animals are eventually a loss to the owner beyond what beef value they may possess; but valuable strains have been preserved, so that the final depreciation is not serious. There are scores of infected herds in New York State that are being replenished with sound animals after this method, and the Commissioner of Agriculture of that State is recommending it to the dairymen generally.

The real purpose of the Bang method is to build up a sound herd from a tuberculous one. The existing conditions relative to the duration and extent of the infection are important factors in considering the probable outcome of non-reacting animals in the original herd. In certain herds where the Bang method has been applied under my personal observation the results have been quite different respecting the original non-reacting animals. In one case where there were 17 reacting and 13 sound individuals, but one of the 13 subsequently reacted, although tested semi-annually for four years. In other herds a much larger percentage of the supposed sound animals were victims of this insidious infection.

In one herd of 491 animals tested there were 96 cows that did not react. These were placed by themselves in a practically new barn, and three months later, and every six months thereafter, the sound herd was tested. Those that responded were promptly removed and the stable thoroughly disinfected with 5 per cent. carbolic acid after each test. The results of the consecutive tests of the non-reacting animals are exceedingly instructive. They are as follows:

1904.	July	96	tested;	31	reacted,	65	did not	react;	32.2%	reacted.
1905.	Jan.	65	"	8	"	57	" "	"	12.3	"
	July	57	"	15	"	42	" "	"	26.3	"
1906.	Jan.	42	"	15	"	27	" "	"	35.7	"
	July	27	"	3	"	24	" "	"	11.1	"
1907.	Jan.	24	"	2	"	22	" "	"	8.3	"
	July	22	"	1	"	21	" "	"	4.5	"
1908.	Jan.	21	"	1	"	20	" "	"	4.7	"
	Aug.	20	"	1	"	19	" "	"	5.0	"

During this time these animals were kept by themselves. There was no opportunity for infection after they were removed from the general herd. Several of the reactors were examined post mortem. The lesions were slight in extent, but of long standing. They were surrounded by a wall of fibrous

tissue. The conclusion seems to be warranted that these animals were infected while associating with the diseased cattle, and that the lesions had become arrested before the first test was made. The lesions in those examined post mortem were too old and the tests were made too frequently to suspect that they could have started and reached the stage of development found in the short time between tests. The repeated tests of the reacting animals in the same herd support this hypothesis. The tuberculin test, made three months later, showed fully 25 per cent. of non-reactors. Several of these continued not to respond, while others reacted again later. This oscillating of the morbid process between an active and an arrested condition is an important factor in considering the future of the supposed healthy animals and in interpreting the tuberculin reaction.

In addition to the value of tuberculin in eradicating tuberculous infection from a herd it is indispensable in examining cows to be purchased in order to prevent its introduction. If they fail to react, and they come from infected herds, it is very necessary that the test be repeated. Experience has shown that when a herd becomes extensively infected (50 per cent. or more reacting), a considerable number of the non-reactors are suffering from latent or dormant tuberculosis, which may become active later. The failure to recognize this fact has caused the disease to reappear in many herds where the reacting animals from the first test had been destroyed. This is illustrated from the following observation: In July, 1906, 92 cows from a tuberculous district were purchased on the tuberculin test. They were tested every six months thereafter. They were kept by themselves for a year, and were never exposed to known infected cattle after their purchase. The results of the subsequent tests are as follows:

1907.	June	92	tested;	0	reacted.						
	June	92	"	3	"	89	did not	react;	3.3%	reacted.	
1908.	Jan.	89	"	24	"	65	"	"	26.9	"	
	Aug.	65	"	4	"	61	"	"	6.2	"	

In 1907 there were purchased for a dairy herd on the tuberculin test 65 cows from a dealer who had secured them from a district in which there is considerable tuberculosis. At the same time 52 cows were bought from a herd that has been kept free from this disease. The results of the subsequent tests of these two groups of cattle which were kept separate and not exposed to other diseased animals are instructive:

(1) COWS FROM INFECTED HERDS.

1908.	Jan.	65	tested;	17	reacted,	48	did not	react;	26.2%	reacted.	
	Aug.	48	"	0	"	48	"	"	0	"	

(2) COWS FROM A TUBERCULOSIS-FREE HERD.

1908.	Jan.	52	tested,	0	reacted.
	Aug.	52	"	0	"

These animals were exposed to as much infection—if there was any at all—in barns and pastures as the previously mentioned cases. It is unfortunate that we have not records of these animals extending over a longer period of time, but they are sufficient to point out the importance of considering both the accuracy of tuberculin and its limitations.

Tuberculosis is unlike most other infectious diseases in that the tuberculous animals still retain their beef and breeding values if the disease is detected early. It is this intrinsic value of the slightly infected animal, in some cases exceeding its value as a milk producer, which justifies the opinion set forth in this paper, that for the best and quickest results in eliminating bovine tuberculosis it must be controlled in individual herds. It is in this connection that the subject comes close to the practising veterinarians, who, as guardians of the health of the animals, have not only great responsibilities concerning the prevention of this disease, but also unlimited opportunities.

The work in New York has pointed out very clearly the danger of building up herds with non-reacting individuals taken from herds in which there is a greater or less amount of tuberculosis. The sound herd, rather than non-reacting individuals, should be sought for by the purchaser. This will require more attention to breeding and less indiscriminate buying of cattle. The essential facts that have been elicited from the results of our work, and which we have found to be important in the control of tuberculosis in individual herds, may be summarized as follows:

1. The cattle should be tested with tuberculin, subcutaneous injection, and all of those giving a reaction should be removed. The reacting animals should be either destroyed, slaughtered for beef under proper inspection, or kept for breeding purposes, after the Bang method. The choice of procedure must depend upon existing conditions.

2. The herd should be retested at intervals of from six months to a year, and all reacting animals promptly removed.

3. Cattle for dairy or breeding purposes should be bought from sound herds only.

4. Animals that have once reacted should not be placed with sound cattle, although they may cease to react and remain well to all appearances.

5. Milk from cows of uncertain health should not be fed to calves unless previously sterilized.

6. It is desirable that the owners keep a record of the tuberculin tests of their cattle made by competent veterinarians. Such a record of each animal is a valuable asset.

7. The application of tuberculin should not be trusted to unskilled persons.

8. In eradicating tuberculosis the individual herds are the units to deal with, and their owners must be held responsible for them.

La valeur de la tuberculine dans le contrôle des troupeaux tuberculeux.—(MOORE.)

L'emploi de la tuberculine comme agent diagnostique a rendu possible la découverte de l'éxtendu de la tuberculose bovine en Amérique. Les efforts faits pour exterminer la tuberculose bovine par la législation, n'ont pas eu le succès auquel on s'en attendait généralement. Quoique l'état ait sa responsibilité dans cette question, les propriétaires de bétail ont individuellement le devoir de prendre des mesures pour que leurs troupeaux ne soient pas malades. La charge d'éliminer la tuberculose bovine appartient aux paysans dont les troupeaux sont ou peuvent devenir infectés. La tuberculine est un agent indispensable pour tenir la tuberculose loin des troupeaux sains ou pour l'éliminer des troupeaux infectés. A New York, les efforts pour combattre la maladie, sont pour la plupart individuels. Entre 1904 et 1906, parmi les bêtes chez lesquelles la tuberculine a été employée, il y eut moins d'un tiers qui furent examinés par l'état.

Beaucoup de propriétaires de bétail n'ont pas pu comprendre l'interprétation de la réaction et de la non-réaction de la tuberculine. L'expérience nous dit qu'après une réaction positive on peut trouver des lésions tuberculeuses, actives à l'examen du cadavre. Quand on n'en voit pas, elles existent certainement, mais se trouvent dans des endroits ordinairement inaccessibles, comme les os, ou bien elles sont microscopiques. Si la réaction est négative, l'animal peut être infecté, mais la maladie est dans la période d'incubation, ou elle est arrêtée, ou encore elle est entrée dans la phase de la guérison. La guérison peut être temporaire ou permanente. Le pourcentage de cas où la maladie est arretée temporairement dans une ferme infectée, est qui ne répondent, par conséquent, pas à la tuberculine, semble dépendre de la longueur du temps depuis que l'infection se trouvait dans le troupeau et du nombre de bêtes qui ont des bacilles. Les fermiers devraient comprendre que les bêtes achetées par eux qui n'ont pas réagi à la tuberculine, mais qui proviennent de troupeaux infectés, peuvent montrer plus tard une réaction positive. On explique le défaut de réaction de la tuberculine dans certains, si non dans tous, les cas arrêtés par la théorie d'Eber, modifiée par Smith, et, en second lieu, on explique la non-réaction dans ces cas par la formation d'un tissu fibreux qui entoure la lésion. Dans ces cas, les produits spécifiques sont pour la plupart limités au foyer ou ils peuvent avoir été éliminés, de sorte que la tuberculine ne vient pas en contact avec eux. Si l'on apprécie bien l'action de la tuberculine et les conditions sous lesquelles elle peut manquer de réagir, on sera plus capable de juger des résultats de l'emploi de ce moyen diagnostique et prévoir l'avenir probable des animaux qui ne réagissent pas.

1. Quand un troupeau est très infecté, un grand pourcentage des animaux non-réagissants peuvent avoir la maladie d'une manière latente. Ces animaux peuvent réagir en n'importe quel temps, pendant quelques années.

2. Quand, dans un troupeaux, il y a très-peu de réactions, les bêtes non-réagissantes peuvent plutôt être libres de toute infection.

3. Dans les troupeaux où il n'y a pas de réactions du tout, on est sûr qu'il n'y a pas d'infection tuberculeuse.

4. Un animal qui réagit et cesse de réagir plus tard, ne doit pas entrer dans un troupeau sain.

5. Les marchands laitiers ne doivent acheter que des vaches provenant de troupeaux sains.

6. L'élimination de la tuberculose bovine dépend des efforts individuels du propriètaire de bétail.

7. La tuberculine ne doit pas être employée par des gens qui ne s'y connaissent pas.

8. La grande aide que nous offre la tuberculine est sa puissance de provoquer une réaction dans une infection active très légère. Ceci donne au propriétaire la possibilité de sauver à temps la valeur de l'animal, comme bête à engendrer des petits ou comme viande.

Der Wert des Tuberkulins in der Kontrolle tuberkulöser Herden.—(MOORE.)

Die Aufdeckung der Ausdehnung und weiten Verbreitung der Rindertuberkulose in Amerika war möglich durch die Anwendung des Tuberkulins als ein diagnostisches Hilfsmittel. Während der Staat seine Verantwortlichkeit zu tragen hat, müssen die einzelnen Rinderherdenbesitzer Massnahmen treffen, um ihre Herden frei zu erhalten. Die Bürde der Anstrengungen, Rindertuberkulose aus der Welt zu schaffen, lastet auf dem Farmer, dessen Herden infiziert sind oder es werden können. Um Tuberkulose von gesunden Herden fernzuhalten oder von infizierten hinweg zu schaffen, ist Tuberkulin ein unentbehrliches Hilfsmittel. In New York sind die Bemühungen, diese Krankheit auszurotten, grösstenteils individuell. Während der Zeit von 1904 bis 1906 probierte der Staat weniger als ein Drittel der Tiere aus, die mit Tuberkulin untersucht worden waren. Die Unterscheidung der Reaktion oder Nicht-Reaktion auf Tuberkulin ist manchem Herdenbesitzer schwer verständlich zu machen. Unsere Erfahrung ist, dass man nach einer positiven Reaktion aktive tuberkulöse Verletzungen bei der Autopsie entdecken kann. Wenn berichtet wird, dass sie nicht gefunden wurden, existieren sie dennoch zweifellos, doch können sie in für gewöhnlich unzugänglichen Teilen, wie den Knochen, vorhanden oder sie können mikroskopisch klein sein. In Fällen, in denen keine Reaktion eintritt, können

die Tiere infiziert sein, aber die Krankheit ist in der Incubationsperiode oder mag zum Stillstand gebracht und in einem Heilungsstadium sein. Die Heilung kann temporär oder permanent sein. Der Procentsatz von Fällen, in welchen die Krankheit temporär in einer Meierei zum Stillstand gebracht wurde, die infiziert ist, und die nicht auf Tuberkulin antworten wollen, scheint von der Länge der Zeit, während welcher die Infektion in der Herde gewesen, und der Anzahl der den Tuberkelbazillus tragenden Rinder abzuhängen. Es ist wichtig, dass die Herdenbesitzer die Möglichkeiten einer zukünftigen Reaktion verstehen, wenn sie Vieh von infizierten Herden auf den Tuberkulinversuch hin kaufen. Die Erklärung des Versagens des Tuberkulins, in gewissen, wenn nicht allen zum Stillstand gebrachten Fällen zu reagieren, ist in Ebers Theorie, wie sie von Smith modifiziert wurde, gefunden für die Wirkung des Tuberkulins und im Heilungsprozess in zum Stillstand gebrachten Fällen, wo die Verletzungen von einer fibrösen Wand umgeben sind. In solchen Fällen ist das spezifische Produkt grösstenteils auf den Herd beschränkt, und irgend etwas, das in den umgebenden Geweben oder der Cirkulation existiert haben mag, kann eliminiert worden sein, so dass das Tuberkulin damit nicht in Kontakt kommt. In einer Würdigung der Wirkung des Tuberkulins und der Bedingungen, unter welchen es versagen mag, zu reagieren, wird man in Stand gesetzt, genauer über die Resultate eines Versuches zu urteilen, und von den gegebenen Verhältnissen sich ein Bild von der möglichen Zukunft jener Tiere zu machen, die nicht darauf antworten.

1. Wenn eine Herde in ausgedehnter Weise infiziert ist, kann ein beträchtlicher Prozentsatz nicht-reagierender Tiere die Krankheit in einem latenten oder schlummernden Stadium haben. Diese Tiere mögen zu irgend einer Zeit während einer Periode von mehreren Jahren reagieren.

2. Wenn in einer Herde wenige Reaktionen sind, so werden jene, die nicht reagieren, eher im Stande sein, frei von einer Infektion zu sein.

3. Wenn keine Reaktionen vorhanden sind, kann das negative Resultat als eine Indikation angesehen werden, dass tuberkulöse Infektion nicht existiert.

4. Ein Tier, welches reagiert, und später aufhört es zu tun, sollte nicht zu einer gesunden Herde zurückgebracht werden.

5. Viehzüchter sollten Kühe nur von gesunden Herden kaufen.

6. Die Eliminierung der Rindertuberkulose hängt von den individuellen Anstrengungen der Viehbesitzer ab.

7. Tuberkulin sollte nicht durch ungeschützte Personen angewendet werden.

8. Der grosse Wert der Tuberkulinversuche ist deren Fähigkeit, eine Reaktion in Gestalt einer sehr leichten aktiven Infektion herbeizuführen. Dies setzt den Eigentümer in Stand, den Fleisch- oder Zuchtwert eines Tieres zu retten.

THE PROBLEM OF BOVINE TUBERCULOSIS CONTROL.

By Dr. M. H. Reynolds,
University of Minnesota, Experiment Station, and State Live-stock Sanitary Board.

A brief review of its historical development may perhaps prove helpful in a careful study of this great problem.

Historical.—At the beginning in each State there has been either an amateurish and premature attempt at eradication, with unsatisfactory and harmful results, or else there has been irregular testing of herds here and there, just because owners wished to know whether their herds were sound, or because they wished to really try the tuberculin test. Such work has been fragmentary and has accomplished little of permanent value.

After a considerable period of this kind of work there has come better organization of individual State work, and there have followed city inspection ordinances providing for tuberculin test of dairy herds.

Following the adoption of such ordinances and the first attempts to put them in force, there has been quite uniformly a prolonged period of frantic opposition by dairymen and fearful anticipation of dire results that were sure to befall the dairy interests and the public milk-supply. Most of these ordinances have led a precarious sort of existence, with many ups and downs, suffering adverse court decisions and many amendments and revisions. But in the mean time the public has been gradually awakening to the fact that there were such things as clean dairies and dirty dairies, and that tuberculosis of cattle was not altogether a myth, but possibly a matter of serious concern. Eventually the dairymen have uniformly fallen into line, conceding the need for this work. The intelligent consumer is by this time asking his dairyman when he had his cows tested and whether he is quite sure that they were all tested.

The miscellaneous scattered work has been gradually increasing over the State, but a careful estimate will always show that but a very small percentage of the entire cattle in any large neighborhood have been tested. Purchasers of breeding cattle soon begin to inquire whether the prospective purchase has been tested or whether the owner will sell subject to test. A few herds are advertised guaranteeing freedom from tuberculosis. Municipal public opinion is by this time generally supporting the idea of city work, and public opinion in general is calling rather blindly for something

more general and more effective, something on a larger scale, but with a very vague idea of what that something may be.

State dairy associations and live-stock breeders associations soon begin to pass resolutions calling for the testing of breeding cattle. And the principle of reimbursement is quite firmly established.

Up to this point—and this is where we are at present in the few States which are most advanced with bovine tuberculosis—the work has not usually been conducted on any comprehensive or well-organized plan that can possibly lead to eradication or to a positive control. Herds that have been tested have not been wisely retested, if at all. Stables in which testing was done have been poorly disinfected, if, indeed, thorough disinfection has been attempted. Stables from which tuberculous cattle have been removed have often been refilled with untested cattle.

I believe that Minnesota has done as much effective work as any other State in the Union, but our work is open to this same criticism of lacking permanence and of incompleteness. We are using a large quantity of tuberculin—and testing a large number of cattle in comparison with other States. Several other States are doing a considerable amount of tuberculin work, but, as the small boy expresses it, we are not getting anywhere. There is no finality about it. We are not getting to the end of the road.

Public sentiment in Minnesota, and perhaps in Wisconsin, Pennsylvania, and other States, is nearly or quite ready for some important development. There is no very clear idea as to what that development may be, for there are two things lacking: first, a comprehensive plan that has in it the possibility of an actual working out; and, second, provision for financial support.

We have passed through a long period of preliminary training for the public and for those in charge of the work, and several States are nearly ready for something different and better. The question is what that something may be. Before taking up this question as a problem to be solved, let us see what individual States are already doing.

A Study of Individual States.

From the list of States that have been doing serious work with bovine tuberculosis I have selected Minnesota, Pennsylvania, Wisconsin, and Massachusetts, because these are pioneers. Their present laws and methods are outgrowths of years of experience. A study of these four will bring out all the important features and methods used in the United States.

The statements made under this heading are based upon the most recent and reliable authority which the author was able to secure. It may be that some States whose work is here discussed may have changed their procedure by the enactment of new legislation or otherwise, and hence possible errors in the present discussion are apparently unavoidable.

WISCONSIN.

The Sanitary Machine.—Wisconsin has placed her veterinary sanitary work with a live-stock sanitary board consisting of three members of the State Board of Agriculture, the experiment station bacteriologist, and the State veterinarian. The State veterinarian is appointed by the governor.

Board members serve without salary, but are paid three dollars a day and expenses when in service. To this board is given the duty of protecting the health of domestic animals, especially against the serious infectious diseases. It has the usual authority to quarantine, kill, make regulations, and so forth.

This State has been making a special feature of public demonstration and educational work. Such demonstrations are frequently held at the agricultural college and at farmers' gatherings over the State. The Wisconsin station has also published a number of valuable bulletins on the subject of bovine tuberculosis.

Distribution of Tuberculin.—An interesting feature of the Wisconsin work, and one which the writer has been watching with some curiosity, has been the general distribution of bureau tuberculin to parties making application. The Wisconsin experiment station in connection with the sanitary board furnishes tuberculin freely and gives instructions for testing to their agricultural students, short-course students, and others, and these are encouraged to do general testing.

Satisfactory information has not been obtained concerning the practical working of this method; but it seems quite certain that a State can hardly continue long to pay, directly or indirectly, indemnity to owners on tests so made, even though the records may be reviewed by the State veterinarian's office.

An official statement published in 1908 gives figures for total tuberculin work. This report shows for the year 1905–06, 9718 cattle tested, 17.7 per cent. reacting; and for 1906–07, 15,816 cattle tested, 8.1 per cent. reactions. During the year 1907–08, 40,993 cattle were tested, with 5.6 per cent. reactions—a total of 66,527, with 8 per cent. of reactions. The total number of cattle tested in Wisconsin by veterinarians for the State during the year 1907–08 is 13,791. As there was a total of nearly 41,000 cattle tested in Wisconsin during the year, there must have been about 27,000 unofficial tests by others using bureau tuberculin furnished by the experiment station. It is thus seen that approximately two-thirds of the testing done in Wisconsin during the past year has been done by farmers, short-course students, dairy-course students at the agricultural college, and farmers in general.

Tuberculous Cattle.—The owner of condemned cattle is granted an option (1) of retaining animals under quarantine, or (2) he may ship them to an

abattoir for slaughter under Federal inspection. In case he chooses the latter procedure, the owner receives the returns from carcass sale and has no further claim against the State. (3) If the owner does not choose either of these methods and the board deems it expedient to slaughter, the owner receives written notice. After a certain procedure, appraisal is had. The amount of appraisal is based upon the value of cattle in conditions as found, the limit being $50. The board may then order such diseased animals shipped for killing to some point where Federal inspection may be had.

It is ordered that the owner shall receive no compensation until the board is satisfied with the disinfection given the infected premises.

Wisconsin pays two-thirds of the appraisal, the amount to be expended not being limited. Assuming that the $60,000 officially reported as paid for condemned cattle during 1907–08 was for the total 2334 reactions, we have a showing of $25.70 per head paid owners, or $25,700 per thousand cattle for reimbursement. The State receives for carcasses $7250 per thousand. Net reimbursement in Wisconsin was therefore $18,450 per thousand.

A statement of the expense of office management in the experiment station's part of this work indicates a cost of $103.75 per thousand cattle tested.

Results.—The census for 1900 gives the total cattle for Wisconsin as 2,314,000. From the best official information, Minnesota cattle have increased approximately 60 per cent. during the same interval, so that 40 per cent. is probably a conservative estimate for Wisconsin. On this basis the present cattle of Wisconsin would number about 3,240,000.

For a study of the amount of eradication work being done by any of the States that are leading in this work, suppose we take Wisconsin, with her 3,240,000 cattle—not as a criticism, nor even as a special study of Wisconsin, but as a general study. Nor does this study of Wisconsin work, or that of the other States here especially considered, take into consideration the splendid and absolutely necessary work in these and other States in the way of educating and arousing public sentiment. At the rate of testing done this year, including the unofficial tests (two-thirds of the total), we have about 41,000, the highest record for one year. By process of simple division we find that about eighty years would be required to test once all the cattle in the State, and one test accomplishes very little toward eradication.

Supposing that the plan of complete eradication is not undertaken, and Wisconsin should attempt to test only her breeding herds and her dairy cattle. A Wisconsin official connected with this work estimates that there are at last 1,200,000 dairy cows in the State to-day. It would be foolish to test only the cows in any stable, so that it will be quite safe to bring the dairy herds up to 1,400,000. This, plus 64,800 pure-breds,

gives us 1,464,800 cattle to be tested, including only the classes of cattle that are the worst and most immediate sources of dissemination. Testing 41,000 per year would require thirty-five years to test once these most serious sources of immediate danger.

I wish to repeat here and very clearly that these statements are not made in an unkind spirit or to belittle the work. Wisconsin deserves generous recognition as one of the pioneers in this field, and for a large amount of work done as compared with the majority of other States.

MASSACHUSETTS.

Sanitary Machine.—In this State authority for dealing with infectious disease of domestic animals is vested in a cattle bureau consisting of one individual—the chief. This bureau works in close connection with local boards of health through inspectors appointed by the local boards and approved by the chief. The Massachusetts law places the first responsibility for examinations, which are physical, upon these local inspectors. These inspectors are not trained veterinarians, but laymen.

Work and Method.—Tuberculin test work is divided into three classes:

(*a*) Examining cattle quarantined by local inspectors or reported by owners as suspected. These cattle are examined by proper agents, who destroy or advise release of quarantine.

(*b*) Quarantine work and tuberculin testing with imported cattle.

During the year ending November 30, 1907, there was done under division "*a*" the following work:

There were quarantined 2985 cattle. Of these, 723 were released; 1478 were condemned, killed, and paid for. Number condemned, killed, and in process of settlement, or otherwise disposed of, 401. Of this item, there were 10 killed, with no post-mortem lesions found.

Work under class "*b*" for this same year shows that the cattle imported at Brighton numbered 84,677. Of these, there were tested 14,480, the remainder being presumably cattle belonging to classes not subject to importation test. Of the tested, 169 were condemned and 49 others were killed on permit. There were released 14,262. In addition to these records for Brighton, official report shows that there were 7238 additional cattle brought in for dairy and breeding purposes, of which about one-third were tested before shipment and the remainder after arrival.

Massachusetts is doing a very large amount of herd inspection, the tuberculin test not being commonly used on Massachusetts cattle. The eighth semi-annual report, January, 1906, gives the total for the year of 32,760 herds inspected; total animals inspected, 230,140, including 143,300 milk-cows. I did not find a statement as to the number of animals so condemned; but very low pay is given these lay inspectors,—in some of the smaller towns,

$15 to $20 per year,—hence it is hardly conceivable that these inspectors are doing efficient work, even in the way of physical examination.

Tuberculin test is imposed for imported dairy and breeding cattle. Beef cattle for slaughter, calves under six months of age, and export cattle are exempt from test. Some testing is done for owners upon applications.

Expenditures.—The following items are given in round numbers and for the year ending November, 1906. The total available for all veterinary control work was $95,854. In this there is included $18,854, balance of a special appropriation for deficiency in 1905 accounts, and appropriations for 1907 work, $77,000. Of this total there was expended $89,337. There were unpaid balances and accounts at the end of the year sufficient to leave a deficit of nearly $3500. These funds were expended in part as follows: (1) Total salaries, $20,232, excluding special agents and expenses for glanders work; (2) employees' expenses, $9896; (3) paid for condemned cattle, $42,326.

Some portion, probably small, of items 1 and 2 should evidently be charged to glanders and other live-stock sanitary board work. The office expenses, including salaries of chief, clerks and assistants, and miscellaneous office expense, amount to $6960.

The officer in charge has estimated for the year ending 1908 for $77,000 to cover all veterinary control work; $7000 of this is for office salaries and expenses and $70,000 for general outside work. The maximum allowance for tuberculous cattle is $40; average for several years is something less than $21.

Results.—The chief's personal estimate of results is to the effect that inasmuch as Massachusetts is killing a few more on physical examination each year, there is probably being accomplished but little in the way of decreasing prevalence; and that they are simply killing cattle that are of special menace to human health.

PENNSYLVANIA.

Organization.—Pennsylvania has a State live-stock sanitary board consisting of the governor, secretary of agriculture, dairy and food commissioner, and State veterinarian. The State veterinarian is ex officio a member and presumably executive officer of the sanitary board, and at the same time reports as State veterinarian to the secretary of agriculture, which makes this organization somewhat confusing to an outsider.

Apparently the arrangement is to the effect that control work with infectious diseases which involve the community as a whole, and dealings with owners of such diseased stock and with owners whose stock is not yet affected, are under the sanitary board; while subjects relating to the health of animals and sanitary work in general, aside from work with infectious

diseases, fall upon the State veterinarian as an officer in the department of agriculture rather than upon the sanitary board. The State veterinarian apparently acts in dual capacity as executive officer for the sanitary board and as State veterinarian in the department of agriculture.

Method.—Dairy and breeding cattle are imported subject to tuberculin test at the expense of the owner.

The Pennsylvania work with tuberculosis is apparently based to a considerable extent upon the theory that owners realize the seriousness of the question, and that they will gladly coöperate if fairly treated, desiring to eradicate.

If an owner wishes to have cattle tested, he makes application to the sanitary board. In order to secure this assistance, he must agree to aid in the examination; to quarantine reacting animals promptly; to disinfect stables; and to improve the stable sanitation if directed to do so.

Application for test from owners whose cattle are not known to be affected may be granted with the owner paying the expenses of test. Official reports are to the effect that so many applications are received that they cannot all be granted with present available funds. An attempt is therefore made to confine the work to the worst infected herds.

When cattle are tested under application from the owner, he must agree to retest at his own expense within eight months, provided one-fourth of the original herd is found to be tuberculous. He also agrees that he will not add untested cattle to his herd thereafter.

An interesting feature of the Pennsylvania work is that when cattle are killed for beef and incidentally found tuberculous to an extent which condemns the carcass for food purposes, the carcass may then be appraised and paid for by the State at a price not exceeding $25 for the entire carcass.

When an owner has cattle inspected by a veterinarian at his own expense and finds some animals diseased, he may apply to the State for assistance in disposing of the cattle that are tuberculous, and receives practically the same help in practically the same way as though cattle were tested at State expense.

When Pennsylvania cattle have reacted in the course of State work as already outlined, they may be disposed of in different ways: (1) Such cattle may be first appraised and then killed. Appraisal considers actual value and condition of the animals, the limits being $25 for grades and $50 for registered cattle. Owners receive the full amount of appraisal, which, however, must not exceed three-fourths of the actual value at time of slaughter. The owner receives the carcass salvage in addition to such appraisal, and the cattle are killed under inspection. (2) Reacting non-clinical cattle may be retained under certain restrictions, presumably for use according to the Bang system. It is stated that owners rarely use this permission.

An interesting provision is made for coöperation between the sanitary board and municipal authorities. When a municipality arranges for tuberculin test of herds supplying city trade, the State board is permitted to bear one-half the cost of such work in case of herds kept beyond jurisdiction limits of the local board of health.

Amount of Tuberculin Work Done.—Pennsylvania uses tuberculin made in her own sanitary board laboratory. During the year 1905 there were distributed about 20,230 c.c. of tuberculin. The laboratory sent out 19,880 c.c. of tuberculin in 1906. We will estimate that this was all used, which would be a very generous estimate for Minnesota. The dose of this varies from 0.25 to 0.4 c.c. Estimating an average dose at 0.33 c.c., there were probably about 60,000 cattle actually tested. The writer was unable to find an accurate statement on this point in the official reports.

For this fiscal year 1905 the board had available a total of $45,000 for general control work. Of this amount, there was expended for reimbursing owners and inspecting cattle for tuberculosis about $29,500. For the year 1906, with the same total appropriation available for control work, the State spent $27,230 for reimbursement and inspection work in connection with this disease. For the year 1904 the sanitary board had available for work $45,000, of which there was spent $31,766 for reimbursement of owners and expense of inspections. During the year 1905 there were condemned 1352 cattle from 773 herds inspected. During the year 1906 there were condemned 1536 cattle from 858 herds inspected.

Please bear in mind that we are not now studying results accomplished in the way of public education and enlistment of public support. These studies of methods and results in the four States selected are presented that we may have a clear view of the amount of field work done with cattle and stables. A further purpose is to show the need for comprehensive plans and large appropriations, and cold figures are more reliable than rhetoric as guides for judgment.

The census of 1900 gives a total of 2,000,000 cattle, of which there are 1,062,000 dairy cows over two years of age, and an estimated 40,000 pure-bred cattle, or a total of 1,102,000.

We have estimated the total number of Pennsylvania cattle tested during 1906 at 60,000. Tests of recently imported cattle should not be included in this estimate. This number tested, when compared with the total number of cattle in the State,—about 2,000,000,—indicates that thirty-three years would be required at this rate for testing all cattle in the State; or, on a basis of 1,022,000 dairy cows and an estimated 40,000 pure-bred cattle, or a total of 1,062,000 dairy and pure-bred cattle to be tested, there would be required for the classes at this rate of testing seventeen years for one test of each herd. One test, even though followed by disinfection, accomplishes

comparatively little in the way of eradication. It will therefore be seen that Pennsylvania, one of the leaders in this work in the United States, is, like other States, really accomplishing very little in the way of eradication or actual control.

MINNESOTA.

The Machine.—Sanitary control work in Minnesota is in charge of a live-stock sanitary board consisting of five members appointed by the governor. Three members must be financially interested in the maintenance of live-stock, and two members must be veterinarians, graduates of recognized colleges. The secretary and executive officer, as well as field veterinarians and other assistants, are employed by the board without any political oversight. It is provided by law that the secretary must be a graduate from a reputable veterinary college. One board membership becomes vacant each year. Board members receive no compensation except actual traveling expenses.

This board meets quarterly for consideration of work accomplished, to plan future work, and consider proposed regulations. The secretary is an executive officer carrying out plans of the board and provisions of the law. The legal basis for this work and powers bestowed upon this board are very broad, so that the board should rarely or never be hampered by lack of authority to do a given work. Apparently the only probable source of failure in a board so organized must lie in sheer incompetence of board members. Thus far there has been described only the central control power of a great machine, for with this State board there are intimately associated by law 2500 local boards of health and health officers, who have certain prescribed responsibilities in connection with this State work and who are subservient to the State board.

Features of the Law.—It is the legal duty, under penalty, for any one who knows of or suspects existence of any infectious disease to report this to his local health officer, and he within twenty-four hours to the State board. In case of animals to be killed, the owner is given all reasonable protection in the way of protest, appraisal, reimbursement, etc., but the protest does not delay killing.

For veterinary control work Minnesota uses and we much prefer the plan of employing field veterinarians on full time and for the exclusive service of the board. This plan is chosen rather than that of deputy or local State veterinarians, who are engaged in private practice and frequently embarrassed in performance of State duty by reason of private practice jeopardized, and by lack of special training and large field experience. There are many reasons which the writer believes to be good which may be advanced in support of this plan.

Minnesota forbids importation of cattle for dairy or breeding purposes except under tuberculin test. The penalty for violation of this is quite severe, being not less than $500 nor more than $1000, or imprisonment for not more than one year.

Minnesota has had for years a law which provides for the pasteurization of creamery skimmed milk. Such milk has proved a very serious source of dissemination for other States that have no such legislation.

Disinfection and Refilling.—It is expressly ordered by regulations that when cattle are tested and diseased animals are removed and paid for, the owner must disinfect the stables in a prescribed manner and must not put any untested cattle into such stables. Violation of this regulation forfeits claim for future reimbursement.

Method with Tuberculosis.—The general plan with tuberculosis is as follows:

Testing may be done by certain veterinary representatives of a State or local boards or by any graduate veterinarian recognized by the State board for this work. When reacting cattle are found, such cattle are appraised on the owner's premises. They are then shipped to some convenient point within the State where there is Federal inspection, and are there killed under such inspection. If no tuberculosis is found, the owner receives full appraisal, which must not exceed $75 for registered cattle or $35 for grades. Carcasses are disposed of to the best possible advantage, and the carcass returns or salvage goes directly to the owner, who is paid in addition by the State three-fourths of the difference between appraisal and carcass salvage.

A large amount of tuberculin test work has been done in Minnesota and a large number of tuberculous cattle have been disposed of—large numbers when we consider them in the abstract or compare with other States, but very small, as will be shown later, in proportion to the total amount of work to be done. The actual amount of work done, together with a study of the results, expenses, returns, etc., is presented in the following statement:

Tuberculin Work for the Year Ending August 1, 1908.—*Registered cattle* tested, 1329; number of reactions, 490, or 36.8 per cent.

Number of reacting animals killed, 428; number of carcasses passed, 199, or 47 per cent.; number of carcasses condemned, 229, or 53 per cent.

Appraised value of 428 cattle, $27,770.50; average, about $64.

Carcass returns, $5296; average, $13.37.

Owners received from the State in addition to carcass returns, $16,795; average, $39.20 per head.

For all registered cattle appraised in addition to this the State spent for freight and yardage, $666.

The total net cost to the State for reimbursement, freight, yardage, etc., was $17,460; or average for all killed, $40.80.

Grade cattle, number tested, 25,887; number reacted, 2000, or 7.7 per cent.; number killed, 1941; of these, there were inspected, 1797; carcasses passed, 851, or about 47.3 per cent. of carcasses inspected; carcasses condemned, 946—about 52.7 per cent. of carcasses inspected.

Killed without appraisal, 144.

Killed with no lesions found on inspection, 52 animals—about 2.7 per cent. of killed.

Total appraisals, $51,027; average, $26.23.

Total carcasses returns, $17,054; average carcass salvage, $8.79.

Paid owners in addition to carcass returns, including full appraisal for the 52 animals, about $25,820.

Freight and yardage, $1,784.85.

The total expense to the State for reimbursement, freight, and yardage for grade cattle was $27,605, averaging for all grades killed, $14.20. Note that this total cost to the State is the merest trifle over $1.00 per head for all grade cattle tested.

The average percentage of reactions for animals tested regardless of breed was 9.3.

Dr. Melvin has recently reported records of 400,000 tests made during the past fifteen years in various portions of the United States and by various authorities. This shows 9.25 per cent. reactions, the average for all breeds and conditions represented. Note two points: (1) the close agreement with the Minnesota average for the past year, 9.3 per cent. for all classes; (2) that only 400,000 recognized tests seem to have accumulated in the past fifteen years in the United States. Minnesota alone has about 3,000,000 cattle.

It is estimated that 41 per cent. of each of the office salaries and expense, field veterinarian salaries, laboratory expense, and 30 per cent. of total traveling expenses may be charged to tuberculosis work under the present Minnesota plan.

Study of Minnesota work shows the following summarized data for the cost of such work:

Cost of office work per thousand tested, $70.20.

Total cost to the State for tuberculosis work per thousand registered cattle tested—reimbursements, freight, and yardage, $13,137.

Net cost to the State per thousand grades tested for reimbursement, freight, and yardage, $1067.

Appraisal per thousand registered cattle, $63,940.

Appraisal per thousand grade cattle, $26,230.

Carcass salvage per thousand registered cattle, $13,370.

Carcass salvage per thousand grade cattle, $8790.

Net cost to the State for reimbursement per thousand registered cattle tested, paying three-fourths of the difference between appraisal and carcass salvage, $12,637.

Net cost to the State for reimbursement per thousand grade cattle tested, paying three-fourths of the difference between appraisal and carcass salvage, $997. Note the relatively great expensiveness of this work with registered cattle.

Financial Statement.—Minnesota during the present biennium has available $130,000 exclusively for work with tuberculosis and glanders. As before stated, it is estimated that 41 per cent. of the total office and field veterinarian's salaries may be charged to tuberculosis and 30 per cent. of the total traveling expenses. The sums paid in reimbursement for tuberculous cattle during the past year have already been given.

Results and Present Situation.—It is stated on good authority that there is not an untested herd of pure-bred dairy cattle in the State. A considerable proportion of the other breeding herds are reported as tested one or more times. We have twelve cities with tuberculin test ordinances in effect or which will very soon be in operation.

Our cattle-breeders are becoming very cautious about buying untested cattle. The State Dairy Association at several annual meetings during the last few years has indorsed the tuberculin test without a dissenting voice, and called upon the legislature for legal provision whereby stock sold for breeding purposes must be sold with tuberculin test or subject to test.

Of the special features of Minnesota's law and methods there may be summarized the following:

There is a peculiar organization of the sanitary board, previously described. There is a fairly comfortable financial situation, with $130,000 for the last biennium exclusively for glanders and tuberculosis; $172,000 for all work for the board.

There is a close organization of local health officers and township supervisors with the central board. There is concentration of energies and funds on dairy and creamery herds and pure-bred cattle—the most serious factors in disseminating the disease among other cattle and most threatening to people.

A hasty survey of the figures for work in Minnesota, as in other of the few States that are doing considerable work with tuberculosis, gives the impression that the State is doing a great work, and so it is when we consider that as such problems and movements go, this work is young. But when we consider work already accomplished or that can possibly be accomplished by our present methods and funds in the light of the entire problem, the amount of work done in Minnesota is trivial. To illustrate this, let me suggest that we have a total of nearly 3,000,000 cattle in the State, of which there are 590,000 creamery and city dairy cows and about 60,000 pure-bred cattle. In these classes alone, the most serious classes, we have 650,000 cattle.

At the present rate of 27,216 cattle tested officially last year, it would require about twenty-four years to test the dairy and breeding herds alone, or one hundred and eleven years to test all the cattle in the State. Testing infected herds at intervals of five years, or even two years, for instance, would accomplish very little toward eradication, as every experienced veterinary sanitarian well knows. Testing only these most important classes of cattle once in twenty-four years is accomplishing nothing so far as eradication or effective control work is concerned. We are simply removing a small proportion of the infected cattle capable of disseminating infection. Think of the 142,000 farm cattle barns in Minnesota, and 3650 other barns containing cattle in the State, any of which are possible sources of infection; and, worst of all, we do not know which herds and which stables are disseminating this infection.

Gathered from Study of Individual States.

There appears to be very much to criticize in the best work of the best States so far as actual results are concerned, and many things worthy of praise in the poorest—if we consider age of the work, time, conditions, and opportunities. This study of individual States forces certain conclusions:

It is apparent that the most important among results thus far actually accomplished toward efficient control of bovine tuberculosis has been in the way of public education and the enlistment of a favorable opinion.

1. The work with cattle and stables is fragmentary, unsystematic, and accomplishes little in the way of permanent results, but is perhaps the best that could be reasonably expected up to this time.

2. The best field work being done leaves untested and unprotected a large proportion of the most important classes of cattle, and a large amount of testing is being done with herds capable of doing little harm.

3. Available appropriations are very small, if we consider human lives and live-stock interests to be protected. It should be remembered in considering justification for large appropriations that the live-stock interests are not the only ones involved in live-stock sanitary work, even if we consider only the financial side of the problem and ignore the question of human health. The writer recently heard a large wholesale merchant state in public that jobbers always feel safe in extending large credits to merchants in farming districts where there was plenty of live-stock. When we are protecting live-stock interests, we are protecting to a very important extent the entire commerce of the State or nation.

4. In order that generous appropriations may be had, it is absolutely necessary that the live-stock sanitary control work should be efficient, and should be managed with the most scrupulous economy and honesty and fair treatment, so as to gain and retain the confidence and support of the stock-owner and influential public in general.

5. In order to plan work on a large scale and get results, appropriations must be more stable. A standing annual appropriation upon which a board may depend is to be preferred over larger but uncertain appropriations. This great sanitary problem can never be solved by any temporary measure. Work of permanent value must extend through a term of years. This problem will never be solved in any satisfactory way until it is possible to plan work for years in advance and with the understanding that plans may be carried out.

6. Tuberculin test work which may entitle the owner to reimbursement should be done by veterinarians and their returns accompanied by an affidavit showing definitely just how the test was made and who did it. The sanitary authorities should have a rigid rule concerning tuberculin test that will be accepted, and that rule must be enforced even though in some cases features of the rule may appear to be useless and unnecessarily troublesome.

7. States doing serious work with tuberculosis have had quite enough trouble with tuberculin tests done by veterinarians who know how the work should be done. It does not appear wise to extend this trouble by throwing such work wide open to students and farmers in general, with the State to pay for cattle condemned on such basis, even though some veterinary officer does look over the test records.

8. The writer is convinced, after this study of the work of individual States, that the ideal State organization for this control work consists of a board of about five members, a majority of whom should be ex officio. The secretary and executive officer should be a graduate veterinarian and employed by the board from outside its membership. The board should be composed of veterinarians and prominent owners of live-stock. The members should serve without compensation or opportunity for remunerative employment by the board. The veterinarians and live-stock memberships in their influence on the board, and considering the secretary, should be fairly balanced. I would not have such a board composed exclusively of either veterinarians or live-stock men.

This board should be in close coöperation with the local health officer and boards of township supervisors of the State. Professional politicians should be entirely eliminated, which is not difficult. This board must have ample authority, and should be closely organized in connection with all of the local health officers and township supervisors of the State. Its appropriations must be large and stable.

Eradication.

We frequently hear intelligent people say that all this tuberculosis work is wrong. They say: "You must test all the cattle in the State and

eradicate the disease, and that is the only business-like thing to do." Sweeping plans have been proposed for eradication; but those who propose them do not appear to have had a close view of the great difficulties in the way of actually carrying out such propositions.

The problem of tuberculosis eradication is a very different one from the Federal pleuropneumonia work of some years ago, which cost only the mere trifle of $1,500,000 and five years' time and involved about six States.

The eradication of foot-and-mouth disease cost less than $300,000, including about $129,000 indemnity paid to owners of cattle. Those tasks were but as child's play, and relatively trivial in expense, as compared with the work of eradicating tuberculosis from the United States. These two sums combined would be small in comparison with the cost of eradicating tuberculosis from Minnesota or Wisconsin, or Pennsylvania, or any one of a large number of States.

It is easy enough to insist on complete eradication, and to say, "Away with tuberculosis!" but when one familiar with this class of work sits down to figure, he is appalled by the way figures run into the millions. And even if an unlimited amount of money were available, there are other and almost insurmountable difficulties in the way of complete, rapid eradication under present conditions. To illustrate this the writer will present a careful estimate as to the expense of so eradicating tuberculosis from a single State. Let us use Minnesota for a study of the general problem and as a national problem.

Basis of Calculations.—Calculations are based on the following standards:

Testing all cattle in the State twice a year for two years and annually for the next five years; stable disinfection after each test; reimbursement to owners of one-half appraisal—owner to receive, in addition, the carcass salvage.

The appraisal limits are $78 for pure-breds, $35 for grades; average appraisal for pure-breds $60, and $26.25 for other cattle; average carcass salvage for registered cattle, $13.37; other cattle, $8.79.

There are about 2,993,600 cattle in the State of Minnesota. Two per cent. of these, or 59,872, are estimated for pure-breds; total dairy cows over two years of age, 590,728.

Our Minnesota records show about 37 per cent. of reactions for pure-breds; other cattle, 7.7 per cent. For this present computation the pure-breds are placed at 15 per cent. reactions, dairy and creamery cows at 4 per cent., other cattle 3 per cent. for the first test, and all classes at 0.75 per cent. reactions for subsequent tests. Pure-bred cattle are valued at an average of $60; creamery and dairy cows at $35; other cattle at $20.

Expense of office management for the past year in Minnesota, during which 27,216 cattle were tested officially, was about $70.20 per thousand

tested. Of this $70, $34 was for clerical work and general office expenses. This item would continue nearly a level rate even when dealing with very large numbers of tests. The other item of $36 for executive salary would not increase with the amount of work, but would practically disappear as insignificant in the general rate per thousand; $35 per thousand tests is therefore used as the rate for expense of office management. The best available figure for a neighboring State is $103 per thousand.

Average cost of disinfection per barn, $13; and the barns averaged in 1900, according to census, 13 cattle each.

Cost of test is based on the following:

Veterinarians employed on full time for testing are put at $1200; helpers, $600. Each pair (one helper and one veterinarian) is allowed to keep one horse at State expense, estimated at $150 per year per horse; beyond this they pay their own expenses. Each pair is to make three tests per week, averaging in all sections of the State 25 animals per test, or 75 per week. Enough veterinarians are to be employed for the first two years to test all cattle in the State once in six months. The number of cattle is supposed to remain stationary. After the first two years, one-half as many veterinarians are employed, so as to test annually.

Objection to these calculations may be raised on the ground that it would be unnecessary to test all herds semi-annually for the first two years. True, there would be a rather large percentage of herds showing no reactions on the first general test. But we have no reliable basis upon which to estimate this percentage. If we could make this correction, but one item in the following list, "cost of testing," would be varied, and the general conclusions would not be affected in the slightest degree.

Computing on these bases, we obtain the following startling figures as to losses and expenses of an active and reasonably thorough eradication work:

TOTAL VALUE OF ALL REACTING CATTLE.

For the first year	$3,289,502
For the first two years	4,527,172
For the seven years	7,121,847

TOTAL NET LOSS TO THE CATTLE INTERESTS OF THE STATE (*i. e.*, VALUATION OF ALL CONDEMNED CATTLE LESS THE CARCASS SALVAGE).

For the first year	$1,968,430
For the first two years	2,492,283
For the seven years	3,931,844

NET LOSS TO OWNERS FOR ALL CLASSES OF CATTLE.

During the first year	$965,204.03
During the second year	1,264,988.71
During the seven years	2,014,447.92

COST TO THE STATE (REIMBURSEMENT), ALL CLASSES OF CATTLE.

For the first year	$650,897.23
For the first two years	898,021.51
For the seven years	1,515,831.21

On the basis previously given the cost of testing all classes of cattle by veterinarians and helpers would amount to:

For the first year	$1,893,450
For the first two years	3,786,900
For the seven years	8,520,525

Suppose it is held that this required number of veterinarians is not available, which is quite true, or that it is unnecessary to employ such expensive men to do the work. By employing farm-school students, dairy-school students, farmers, short-course students, and others,—which procedure experienced sanitarians would hardly approve,—we find that the cost of testing all cattle as before would be:

For the first year	$2,019,666
For the first two years	4,039,332
For the seven years	9,088,497

COST OF DISINFECTING ALL STABLES.

For the first year	$4,686,000
For the first two years	9,372,000
For the seven years	21,087,000

COST OF OFFICE MANAGEMENT AT $34 PER THOUSAND TESTS.

For the first year, testing all cattle	$203,564
For the first two years	407,128
For the seven years	916,038

AMOUNT OF TUBERCULIN USED, B. A. I. STANDARD FOR ALL CATTLE.

During the first year, 11,974 liters, or approximately 2994 gallons.
During the first two years, 23,949 liters, or approximately 5987 gallons.
Total for the seven years, 54,885 liters, or approximately 13,471 gallons.

During the past year the government distributed a total of 259,100 c.c. tuberculin, which cost the government to produce about $10 per liter.

To test all the cattle in Minnesota alone on this plan for the first year would require forty-six times this entire Federal output.

The cost of producing tuberculin needed on this plan would be:

During the first year	$119,740
For the first two years	239,490
For the next five years	299,350
Total for the seven years	538,840

Total expense for veterinary services, disinfection, reimbursement, office management, and including the cost of producing tuberculin, which could perhaps be produced by the State at about the same expense as by the government:

For the first year	$7,553,650
For the first two years	14,703,540
For the seven years	35,004,260

The total value of all Minnesota cattle in 1900 was $37,197,198. The present value of Minnesota cattle is probably about $50,000,000. These figures give a careful estimate as to the actual cost of rapidly eradicating tuberculosis from one State only.

The total annual expenditures for all purposes by this State amount to about $6,500,000. Eradication work on this basis during the first year would require considerably more than the entire available resources of the State that year. Can there be any question concerning the hopeless impossibility of rapid eradication under present conditions and with present available agencies? Nor may we reasonably expect complete eradication in the near future. But if absolute eradication, which would be ideal, is unattainable, is it not the part of wisdom to content ourselves with the best work that may be within the limits of reasonable possibilities?

Eventually there will come a time when public sentiment will support thorough and careful work, and when sufficient funds may be secured to carry on a large work. We may yet have a cheap, safe, and efficient vaccine, and other aids unknown at present may then be available. But we must not wait for public sentiment and other conditions to be entirely favorable before making a beginning. The progressive sanitarian must always work somewhat in advance of public sentiment, meanwhile doing his part toward a wise development of public information along intelligently progressive lines.

Solid Ground in Sight.—Thoughtful students of this problem are beginning to ask the question, "What next?"

Those engaged in this work have been wading through an unknown slough for something like fifteen years, and we are beginning to feel that we have found some spots of good, firm ground. There have been developed certain general principles upon which we may base future work.

So far as we can see now, it is evident that comprehensive plans for dealing with the bovine tuberculosis problem must be based upon tuberculin test.

Tuberculin is firmly established as a reasonably accurate diagnostic.

Tuberculosis is now recognized as a serious menace to human health and as an actual source of danger and a constant threat to live-stock financial interests.

It is well established that this is not a disease of breed or type and we are probably well acquainted with the sources and methods of spread.

The principle of indemnity is apparently established as a necessary preliminary procedure.

It is clearly established that one tuberculin test and one disinfection cannot be depended upon to eradicate tuberculosis from an individual stable, and we must plan with this in view when attempting to do thorough work. The classes of cattle which are most actively spreading the infection should be tested first, and this means city dairy cattle, creamery herds, and pure-bred herds.

The first re-test of reacting herds should be given in about six months, and there should be preferably semiannual tests for the first two years, and thereafter annual tests as needed.

There must be adequate disinfection after each test where reacting animals are found.

Stables must be refilled with tested cattle only, or the owner should forfeit his right to future indemnity. There must be used some reliable system of marking that will obviate the probability of fraud.

It is quite clear also that we must have the coöperation of owners and the support of public opinion before anything effective can be accomplished. On the other hand, it will not do to wait for this before making an active start in the work.

Ideal State work employs field veterinarians on full time and in exclusive service rather than deputy or assistant State veterinarians engaged in private practice.

Importation of cattle for dairy and breeding purposes to a State that is undertaking any serious tuberculosis work should be only under the guarantee of a competent tuberculin test.

We must take up the most serious and urgent problem in order, and the work must continue to be something of an evolution.

A Proposition for Control Work.

After a careful study of this problem extending over quite a period, the writer is disposed to suggest a program for dealing with the problem of bovine tuberculosis control.

It is unquestionably desirable to locate, by tagging or otherwise, and deal only with infected herds, but the practical possibility of this on the needed scale has not been demonstrated. There are very difficult problems and complicated details yet to be worked out.

Assuming that a State has a good law and an effective sanitary machine, both having the qualities and features already outlined, I submit the following to be taken up in the order given:

1. In the early history of control work with tuberculosis all resources of energy and money should be concentrated as closely as possible upon importations, dairy and creamery herds, and pure-bred herds. Whenever public sentiment and available funds may justify more thorough work, there should be undertaken what may be as nearly as possible eradication of tuberculosis from these three classes of cattle.

2. The first compulsory testing should be of all herds from which milk is offered for sale in the cities, towns, or villages, with suitable provision for re-testing, refilling with sound cattle, and proper disinfection of the stable.

3. All cattle sold for breeding purposes should be sold with certificates of test or subject to test under such wording of the law as will protect the purchaser against fraud. Compulsory test of all cattle in breeding herds would, of course, be preferable, but there might be question whether it is feasible to force the test for breeding cattle not actually on sale and so long as the cattle remain in the present owner's herd.

4. Compulsory testing of all creamery herds may come third, provided the State has effective provision for pasteurizing creamery skim milk. This should imply suitable re-testing, refilling, and disinfection.

5. Cattle imported for dairy or breeding purposes must come in with satisfactory certificate of test forwarded to the secretary of the sanitary board, or cattle should be held at the first suitable point within the State for testing. Testing imported cattle should be done at the owner's expense, and every possible precaution taken to avoid fraud.

Heavy fines must be imposed upon violators of this provision, and the penalty should fall upon either or both the owner and transportation company.

6. All official testing should be done by veterinarians who are definitely listed and recognized by the sanitary authorities.

The sanitary authorities should define fully and in detail just what constitutes a tuberculin test which will be accepted, and every test record should be accompanied by an affidavit from the one who signs the test records; which affidavit should specify just what and how much the affiant did in connection with the test.

Financial Statement.

A series of computations have been made in order that we may have a clear view of the probable cost of eradication from city dairy, creamery, and pure-bred herds. Knowing approximately the cost, we may more intelligently consider the feasibility of undertaking the work; let it be clearly understood that the following is offered as information that may be useful, and not as work and expense which States are now advised to undertake.

The bases for calculation are the same as for those previously used in studying the possibility of complete eradication.

VALUE OF REACTING CATTLE IN THESE CLASSES.

CITY DAIRY AND CREAMERY.

First year	$982,065
First two years	1,292,165
For seven years	2,067,415

PURE-BREDS.

First year	$639,882
First two years	1,041,950
For seven years	1,547,120

TOTAL FOR BOTH CLASSES.

First year	$1,621,947
First two years	2,334,115
For seven years	3,614,535

TOTAL NET LOSS TO CATTLE INTERESTS OF THE STATE.
(Total healthy value of condemned cattle minus carcass salvage.)

CREAMERY AND CITY DAIRY.

First year	$660,670
First two years	738,557
For seven years	933,276

PURE-BRED CATTLE.

First year	$519,808
First two years	571,789
For seven years	831,693

TOTAL, BOTH CLASSES.

First year	$1,180,478
First two years	1,310,346
For seven years	1,764,969

NET LOSS TO OWNERS.

PURE-BRED CATTLE.

First year	$219,667.88
First two years	240,588.63
For seven years	222,890.50

CREAMERY AND CITY DAIRY.

First year	$227,895.66
First two years	299,704.80
For seven years	497,222.65

TOTAL OF BOTH CLASSES.

First year	$447,563.54
First two years	540,293.43
For seven years	772,113.15

NET COST TO STATE FOR REIMBURSEMENT.

PURE-BRED CATTLE.

First year	$209,387
First two years	230,326
For seven years	282,672

CREAMERY AND CITY DAIRY HERDS.

First year	$176,282
First two years	242,388
For seven years	407,652

TOTAL OF BOTH CLASSES.

First year	$385,669
First two years	472,714
For seven years	690,324

COST OF TESTING.

COST OF TESTING BY VETERINARIANS, CREAMERY, CITY DAIRY, AND PURE-BREDS.

First year	$650,175
First two years	1,300,350
For seven years	2,925,787

The number of veterinarians required for the first two years would be 333, and for the next five years 167.

If it is argued that there are not enough veterinarians available for this work at the proposed salary, and that the work could be done by graduates of agricultural colleges, short-course students, dairy-course students, etc., then the calculation and testing would be as follows. The author would not approve of this method, but will submit the calculation:

COST OF TESTING CREAMERY, CITY HERDS, AND PURE-BREDS.

First year	$550,150
First two years	1,100,300
For seven years	2,475,675

COST OF DISINFECTING STABLES.

(This is on the basis of 50,000 barns for city dairy, creamery, and pure-bred herds, which is very nearly correct for Minnesota.)

First year	$650,000
First two years	1,300,000
For seven years	2,925,000

COST OF OFFICE MANAGEMENT.

(For creamery, city dairy, and pure-bred cattle at $34 per thousand tests—possibly high for work on large scale.)

First year	$44,200
First two years	88,400
Seven years	198,900

AMOUNT OF TUBERCULIN USED AND COST.

CREAMERY, CITY DAIRY, AND PURE-BRED CATTLE.

First year, about 2600 liters, or 650 gallons, costing	$26,000
First two years, 5200 liters, or 1300 gallons, costing	52,000
For the seven years, 11,700 liters, or 2925 gallons, costing	117,000

TOTAL COST OF ERADICATION.

These figures indicate that the total cost of eradication in seven years on this basis and from these classes—city dairy, creamery, and pure-bred herds—would be as follows:

First year	$1,756,040
First two years	3,213,460
For the seven years	6,857,000

Data.—It is interesting to note in this connection that on this basis there is required 0.5 of a gallon B. A. I. tuberculin per thousand cattle per test.

Testing by veterinarians would cost, on the basis previously given, very nearly 50 cents per head. Testing by farm school graduates, etc., would cost about 43 cents per head.

The cost of disinfection on the basis given amounts almost exactly to $1.00 for each animal tested for each disinfection.

It is possible that some more economical plan for utilizing tuberculous cattle than by slaughter and carcass salvage may be developed.

This may come with tuberculosis stock farms under private management, licensed by the county or State: or possibly with tuberculosis farms managed directly by the county or State. No difference what form this plan may assume, it is safe to say that it will receive a royal welcome after it has "made good," as we say in American phrase.

In order to stand test, any plan for utilizing tuberculous cattle must answer favorably to one difficult question: Is it profitable in cold dollars? Can tuberculous cattle, whether mixed grades or pure-breds of many breeds, be purchased at the average price of carcass salvage and then be managed profitably in the United States, with the products honestly labeled and competing in the open market with similar products from healthy cattle?

With this question in mind, the writer has been unable to formulate anything that would stand careful analysis. Neither has any method suggested by others come under observation that does not appear hopelessly impracticable. Several have suggested plans, some features of which may yet be utilized, and we may all wish earnestly that something better may appear.

In Conclusion.—It need not be argued in this connection as to whether vigorous control work on a large scale should be done by the State alone or by the State with Federal aid, or whether by Federal authorities chiefly. Abrogation of police powers of a State involves legal questions which need not enter into this discussion. But whether this final work of eradicating tuberculosis from these three classes of cattle is to be undertaken by the State alone, or by the State with generous Federal aid, it is very evident that the work must be done with individual States as units.

Hitherto there has been too much theorizing and too much guessing. Students of this problem have been dealing too much with glittering generalities. It seems high time for us to develop some tried bases for more efficient work; time for statements of basic principles and quite time to outline large plans. Our owners and consumers and legislators are entitled to practical plans and prosy statements of probable cost and probable results.

Let us all—all who are directly interested in this problem and familiar

with it—endeavor to work out practical methods of doing much larger and much more efficient work than we have been doing.

"Still achieving; still pursuing,
Learn to labor, and to wait."

DISCUSSION.

Mr. F. O. Beall (Maine): I beg to make some exceptions to some of the statements in this paper. The author speaks of the best States in the Union, and refers to Massachusetts. He also speaks of them as the pioneers in eradicating tuberculosis. I would like to say that we were pretty nearly the pioneers in this work, as we started in the sixties to eradicate bovine tuberculosis from our State, and we are getting satisfactory results. We have laws to uphold us in anything we wish. There is a law in Maine that does not allow cattle to be brought from any other State or territory without first having a special permit from the cattle commissioners. We have so schooled the people of our State that they are demanding the tuberculin testing of their cattle—it is more work than we can do. We have educated the people to the danger of tuberculosis, so that they are desirous of eradicating it from their herds entirely. We have brought them up so as not to expect any salvage for their slaughtered animals. We have also taught them that it is dangerous to consume tuberculous meat.

Mr. Gordon (Washington, D. C.): With reference to the tuberculin test, I was the first man in Pennsylvania to use it, and I have been using it ever since. I believe it is a most efficient way by which to keep a herd clean and free from tuberculosis. I have had twenty-three years' experience with it, and I do not think that this Congress need apologize for its use.

Mr. A. E. Kepford (Iowa): I think that this paper presents one of the most important features of the discussion before this Congress, and especially is this true with reference to States like Iowa. In a fight against human tuberculosis we must recognize bovine tuberculosis as a great contributory cause. For the last few years I have lectured on the subject of tuberculosis, and I am very much interested in Dr. Reynolds' paper. I want to know what measures we are going to resort to in the control of bovine tuberculosis. The stupendous figures mentioned in his paper in connection with the expense of eradicating bovine tuberculosis cast a very gloomy aspect over the problem. It seems to me that there should be come sort of Federal commission that could have control over this bovine scourge. It seems that we lack coherency, and that there should be arrived at in this Congress some coherent method for handling the subject. With reference to tuberculosis among the people, of course, it is wise to teach the people of Iowa the cause and prevention of the disease, but in an agricultural State like Iowa it is

necessary that there should be some coherent action with reference to the transmission of bovine tuberculosis. The matter of salvage should not be considered, or in its consideration there should be no provision for reimbursement for diseased meat.

Dr. Kinyoun (District of Columbia): There are two government agencies which could be used for tuberculosis control—the Bureau of Animal Industry, to prevent cattle coming from one State to another, and also the Bureau of Chemistry, in the control of dairy food-products. Under the recent law, the pure food and drugs act, the Bureau of Chemistry can take action in these matters. The control of milk is practically operative under this law. I fully agree that something should be done for the control of tuberculosis in animals, because I am one who believes that it is a menace to the human race. It will in all probability have to be handled by some governmental control. In view of the fact that millions of dollars have been spent by the national government in eradicating pleuropneumonia and foot-and-mouth disease in the United States, in which instance the farmers were repaid for animals destroyed, I really believe that a precedent would not be established by the government in giving some partial remuneration in the eradication of this great scourge. In the latter case the public health is also concerned. I think the money would be well expended if we could get our herds freed from tuberculosis.

Mr. Beall (Maine): I stated that the people of Maine had been educated to the point where they did not believe the meat of tuberculous animals was fit for food, and therefore they will not use it. The United States Supreme Court has decided that each State by itself may control and keep other animals out of the State, and do anything that will be beneficial to the health of the people.

Dr. Rutherford: There are two aspects of this case which it is well to get differentiated in our minds—one is the control of bovine tuberculosis, and the other is the protection of human beings from meat and milk of tuberculous cattle. The two subjects are quite separate and distinct. I think the health officers should confine themselves to safeguarding the people by preventing the sale of milk coming from dairies which are infected. This is done in a number of communities in Canada and in other States. The tuberculous cows are taken out of the herds and proper sanitary precautions are taken, such as disinfection, etc.

At the conclusion of this discussion the Section agreed that extra sessions should be held on Saturday to hear the remaining papers, and to conclude the discussion of the control of tuberculosis in animals.

SECTION VII.

Tuberculosis in Animals and Its Relations to Man.—(*Continued.*)

NINTH SESSION.

Saturday, October 3, 1908.

CONTINUING THE DISCUSSION OF THE CONTROL OF TUBERCULOSIS IN ANIMALS.

The Section was called to order by the President, Dr. Leonard Pearson, at nine o'clock. At a quarter to eleven o'clock a recess was taken for the sake of attending the closing ceremonies in the Assembly Hall.

PRECAUTIONARY SANITARY LEGISLATION AGAINST TUBERCULOSIS OF THE DOMESTICATED ANIMALS IN THE UNITED STATES.

By D. Arthur Hughes, M.Litt., Ph.D., D.V.M.,
Inspector, Subsistence Department, United States Army, Chicago.

I. The Resolution Referring to Tuberculosis of the Domesticated Animals Passed by the International Congress on Tuberculosis Held in Paris, 1905.

The question of intertransmissibility of bovine and animal tuberculosis has been so much a matter of agitation during the sessions of previous International Congresses on Tuberculosis, and its unsettlement has caused so much anxiety in the popular mind, that it may not be out of place, at the outset, to remind Section VII of the Congress of 1908 of the resolution passed by the Paris Congress in 1905. That resolution read as follows:

"The Congress, after hearing the exposé of the most recent investigations, declares that it is not only indispensable to avoid contagion from

man to man, but also to pursue the prophylaxis of bovine tuberculosis, and to continue to take administrative and hygienic measures to avert its possible transmission to our species, and, finally, that it is desirable to be on our guard against all forms of animal tuberculosis."

This resolution, similar as it is to previous resolutions, in view of the lack of unanimity on the question of intertransmissibility, was happily worded, and wisdom was shown in its passage. Its contents are short and to the point. Its meaning, as understood by us, on this side of the Atlantic, is clear. Its chief note, because of the lack of complete unanimity on intertransmissibility, was *precaution*. It called for the continuation of sanitary law, in the several countries where statutes were operative against the disease, and it implied the necessity for the erection of similar sanitary legal precautions against tuberculosis of the domesticated animals. There has been, up to the present hour, a general disagreement with the views expressed by Prof. Dr. Koch in the London Conference, 1901, and reiterated by him in the Nobel lecture, in part, in Stockholm, December, 1905. As the question of the interrelation of human and bovine tuberculosis is still an open one, there is wisdom in not slacking precautionary measures against tuberculosis of the domesticated animals.

II. The General Sympathy of Sanitarians, in all Parts of the United States, with the Resolution on Animal Tuberculosis Passed by the Congress in Paris.

The position taken by American sanitarians regarding the possible danger of tuberculosis of the domesticated animals to man has, in the past, as in the present, been the same. There has been a general sympathy of all our medical men, whether practising human or comparative medicine, of our investigators, teachers, and writers, with the view corruscated by the Paris Congress in its resolution, and by the previous congresses in theirs. Because of this sympathy, action has been taken by framers of sanitary law, and by sanitarians who administered laws passed, to see that things were done in accordance with the views of that representative body of specialists on the disease which met in the French capital. When I speak of sanitarians, I mean the large body of men of position and power of every sort interested in questions of public health in America—investigators in national, State, and private laboratories, in universities, colleges, and special scientific schools, human medical and veterinary medical teachers, advisers and practitioners, national and State administrators of sanitary law, publicists in general—all have had the conviction that, in view of our lack of sufficient knowledge, on the interrelation and intertransmissibility of the disease, it was best to safeguard fully public interests against the scourge, and, for the present at least, not to slack any law or regulation against human or animal forms of the disease.

The chief of these sanitarians may be grouped as: (1) Those acting under the general or central government; (2) those acting under the governments of the individual States included in the United States; (3) those acting under municipalities in the individual States included in the United States. And in speaking of these groups of sanitarians, we pass to:

III. The Agencies for the Control of Tuberculosis of the Domesticated Animals in the United States.

We may speak, first, of the national government's agencies for the control of the disease in animals.

The source of power for the control of disease among animals by the Federal government is traceable to the written constitution of the United States, which was agreed to by the American colonies in the eighteenth century at the foundation of the government. In it Congress is given power to control commerce between the States composing the United States. There has been much written in interpretation of this provision of the Constitution by writers on constitutional law. If Congress does not enact special legislation governing any form of interstate trade questions, it is held that the individual States may pass laws, at their will, covering their trade with contiguous States and territories. For instance, any State may pass a live-stock sanitary law governing the movement of animals to or from its borders. But as, in reality, the right to enact legislation with regard to interstate questions, the movement of animals between the individual States as well, belongs, by the Constitution, to the general government, the laws of the individual States must give way whenever Congress passes law assuming control.

Up to the year 1884 Congress had not assumed the power over interstate trade in animals. In that year the alarm caused by the prevalence of pleuropneumonia among cattle led to the foundation, by the national legislature, of the Bureau of Animal Industry and complete assumption of control over this branch of the trade. The original purpose of this fundamental act was the control of pleuropneumonia. Still, it was made the duty of the new national agency to investigate, prevent, and control all other contagious, infectious, and communicable diseases of animals. Power was vested in it to move against all dangerous animal infections in the United States. Its scope was made large enough to include all animal plagues. In short, this national agency may, under certain exigencies, assume control of tuberculosis of domesticated animals in its interstate bearings, and may go as far with tuberculosis as it has already done with other animal infections—that is, may suppress it. However, in common with all national agencies for the control of disease, it has, at present, limitations to the use of its power, or limitations which check its power. The ignorance of the populace of the

diseases of animals, like tuberculosis, causes the national agency to halt in its work until the balm of intelligence has sufficiently leavened the masses to allow it to proceed. For the work of prevention of disease is dependent upon the expenditure of large sums of money for exploitation, prevention, control, and appraisement. Money will not be appropriated, nor will the bulwarks of prejudice and opposition to scientific purpose be broken down, until there is a general, unified national feeling and action against such a disease as tuberculosis.

Pending the time when public sentiment would permit its assumption of full power against this disease, and when appropriations of money would allow it to take charge of control work and suppression, this national agency has, in its past and present endeavors in regard to tuberculosis of the domesticated animals, exhibited a commendable spirit in its investigations of questions relating to the disease in its Washington laboratories, in the initiatory field work undertaken in the United States Meat Inspection Service conducted by it.

For a number of years the laboratory work of this national Bureau and the work of the experimental farm in the vicinity of Washington have been devoted to studies of the interrelation of various forms of tuberculosis and the varied virulence of the bacilli of different origins. But the circulars and bulletins containing the results of this work have been given the widest circulation possible, even in the remotest corners of this western continent. Besides, the educational propaganda have included valuable artistically illustrated papers published in the Bureau of Animal Industry annual reports and the year books of the Department of Agriculture. One of the Washington laboratories of this Bureau, the biochemical, manufactures large quantities of standardized tuberculin and distributes it freely among the sanitary officers of the individual States, stipulating that the results of each test be sent in to Washington for filing, in order that a statistical study may be made of the extent of tuberculosis in the United States. Acting under the United States Meat Inspection law of June 30, 1906, this national agency has, in the fiscal year 1907, condemned and disposed of 19,305 whole carcasses of cattle and 10,530 parts of cattle for tuberculosis, and 65,618 carcasses of swine and 364,559 parts of carcasses of swine for the same disease. This work was conducted in 708 meat establishments in 186 cities, where a total of 32,000,000 cattle were inspected and a total of 32,000,000 swine.

The second group of agencies acting against tuberculosis of domesticated animals in America are the agencies instituted, within their own confines, by the governments of the individual States included in the United States, for the control of the disease. The power of each State to control the disease within its own borders is dependent upon the power conferred by the constitution adopted by the people of the State, when its population became large

enough to permit admission of the territory as a State into the American federation. Each State has, under the Constitution, a limited sovereignty covering purely State affairs. Each State has sovereignty only within its own confines, consequently self-limiting. The agencies for sanitary control work among live-stock in the individual States differ greatly, according to the power granted by the State constitution, or depending upon legislative idiosyncrasy. Usually the agency consists of a board of sanitary officers appointed by the governor of the State and accountable to him, the membership of which may, or may not, contain a veterinarian or veterinarians, though commonly the board contains an administrative officer called the State veterinarian. The general purpose of this live-stock sanitary board is indicated by its name—under the governor of the State and the council it administers the sanitary laws of the State. As the live-stock sanitary laws of each State differ greatly in text and purpose, the work of the board is equally simple or complex, according to circumstances. The authority and effectiveness of the live-stock sanitary laws are limited to the State in which they are passed. At the present time the warfare against tuberculosis of the domesticated animals in America is, for the most part, conducted under the provisions of the live-stock sanitary law of the individual States and territories included in the United States, and presently it will be my pleasure to depict, as truthfully as I can, the conditions which prevail under the operations of those laws.

The third governmental agency working against animal tuberculosis is that of the American municipalities. Their power is, of course, much more limited than that of the agency of the State, for ordinances can only refer to their own area. City ordinances aimed at tuberculosis of animal origin must cover chiefly live animals, meat and meat food-products, and milk with specific regulations on goods vended or intended for sale within their limits. The passage of city ordinances directed largely against products infected with tubercle bacilli depends greatly on enlightened public opinion locally. A good deal of work has been done, and is being done, by American municipalities for control of animal tuberculosis, by repudiation of infected products and by prohibition of their sale. The flamboyant city press which describes the nastiness of dairy conditions or the impurity of the milk-supply; the question of infection agitated by the local medical authorities, the medical societies, or in the social circle, have borne fruition in local ordinances. The force of example set by enlightened cities has helped in the formation of State sanitary law. In very many of the States may be found from one or two to numerous towns blessed with such regulations under medical and bacteriological administration. Usually the laws have their origin in the discovery of gross tubercular infection of the dairies supplying the town, and the regulations are aimed chiefly against tuberculosis. This is the case, for ex-

ample, in such widely separated towns as Portland, Maine; Shreveport, Louisiana; Omaha, Nebraska; Fort Smith, Arkansas; Grand Forks, North Dakota; Duluth, Minnesota; in many towns in South Carolina, Colorado, and Montana. The possibilities for good, through the medium of this agency, in city ordinances directed against tuberculosis of the domesticated animals, depend upon the understanding of the citizens of the dangers possible should infection with the disease take place.

But the work accomplishable by these three groups of agencies against animal tuberculosis in the western world—the national agencies, those of the individual States, and those of the municipalities within the States—are beset with many trials. We may now pass, therefore, to:

IV. The Difficulties with which any Movement in the United States for the Control of Tuberculosis in the Domesticated Animals must Contend.

In treating this portion of my subject I may be permitted to place before you the difficulties, helter-skelter, just as they occurred to me, with comment as I proceed.

It is comparatively easy, in small countries like Denmark or Holland, to deal with an infection like tuberculosis. But when we are reminded that the United States has an extent of territory apparently equal in area to that of the whole of Europe, the truth is made graphic that extent of territory is the first difficulty with which we have to contend.

Again, in the United States are found the most varied agricultural conditions, vast herds bred for every purpose and numbering many millions of animals, rapid transit of animals, an enormous interstate and export animal industry.

Further, we have many varieties of climate, causing the economic conditions of breeding, feeding, and housing of animals to vary, and increasing the complexity of the problem of dealing with animal tuberculosis.

Furthermore, the country is new and unsettled conditions prevail. There are still millions of acres unsettled, open ranges of private ownership, State-owned or owned by the nation; places in many States where the cattle, privately owned, are stabled or corraled part of the year, and run at large other parts of the year. There is an intermixing of animals of all sorts, regardless of means or possibilities of infection.

No doubt the wonderful immigration to the United States within the last half century has had much to do with the increase of animal tuberculosis. The teeming millions of Europe, many of which are from the lowest peasant class, settling large agricultural sections of the country and ignorant of the disease, have not helped in its control.

Till thirty or forty years ago the United States, of all countries, had the

least information on veterinary science. Even now veterinary education in America is almost a new thing. Our schools are few, for a continent such as ours is, and widely scattered. The American continent is sparsely settled with veterinary practitioners worthy of the name. The proportion of veterinary graduates or veterinary practitioners compared with human medical graduates or practitioners is amusingly small. Veterinary teachers are only a hundred or two, and many of them are not particularly well taught nor particularly skilful in their specialties. The number of eminent American veterinarians is very few indeed. Of great writers on veterinary science we have hardly any. The widely prevailing ignorance of veterinary science is one of the chief difficulties with which we have to contend in controlling animal tuberculosis.

Moreover, in some places, where, indeed, the people have been taught the dangers of animal tuberculosis for years, there is a stolid indifference to the consequences of carelessness in the matter of this infection. New York State, for example, has had the benefit of the voice and pen of earnest specialists, eminent for their knowledge of animal tuberculosis, for a quarter of a century. Yet, even so late as the past winter, though bovine tuberculosis was shown to be rampant,and his excellency, Charles Evans Hughes, governor of the State, in his annual message to the legislature, recommended a State meat inspection service to aid in its control, none was granted.

Conflicting views on the disease are held in various sections of the country by scientists and others. The human medical profession strenuously maintains the infectiousness of the disease for the human family. Yet, strange to say, they do not take hold of the idea of the infectiousness of bovine tuberculosis with the same anxiety or avidity, for the reason that the dispute over transmissibility of the disease has unsettled many minds.

In the different States conflicting methods of fighting animal tuberculosis are in vogue. In some States there is a lack of information of the extent of the disease among domesticated animals. Worse still,—for example, in Michigan,—the State sanitary officers give positive assurance of the absence of the disease among farm animals in parts of the State. No doubt in many cases such statements are misleading, if not false. Michigan has many cities in its midst—for example, Detroit, Lansing, Saginaw—which would require many dairy herds for their milk-supply, and dairy herds are apt to be notoriously tuberculous.

Many States have no law adequate to control tuberculosis among animals. Still others have adequate law for its control, but they have no money, or insufficient funds at least, provided by the legislature to carry out the law. For example, in the State of Minnesota, which can boast of a splendid system of sanitary control of tuberculosis, the citizens who have animals condemned for the disease, after appraisement have to wait a year or two

for the money awarded to them, because of lack of appropriation by the legislature to make payment for appraised animals.

In many States there are conflicting views on methods of disposition of tuberculous animals or of tuberculous carcasses. Some hold that the carcasses must be burned or buried; others that they may be sold to slaughterhouses and reimbursement given according to the extent of the tubercular lesions. Some States hold that tubercular carcasses have no money value; others that they have a varying worth of from $15 a piece to 40 or 75 per cent. of their market value had they not been tuberculous.

In some States sanitary officers are placed in power, but are not given sufficient prerogatives to control the disease; in still others the officer's hands are tied by conflicting articles in the law, practically nullifying effective work.

Some States have no live-stock sanitary officers, legally constituted, at all. In others the power to control animal tuberculosis is vested in a sanitary board consisting entirely of political farmers, ignorant of the disease—that is, no veterinarians are officially placed on the board by the law.

In some States, again, heavy administrative burdens are entailed on State sanitary officers, whereby it is impossible for them to do their full duty with regard to animal tuberculosis. The States with adequate law against bovine tuberculosis sometimes have States on their borders without such law. Hence it comes to pass that cattle known to be tuberculous in States having strong sanitary law are spirited away and sold in the adjoining States without law against the disease. Again, there is, in sanitary matters, apparently little feeling of sisterhood between the States—States with excellent sanitary laws mentioning in their reports conditions in neighboring States and setting up a blockade against the animals of those States, having the semblance of procedure in legal enactment against a foreign State or a foreign country.

One finds an unwillingness of States containing great cities, or having great cities neighboring them in other States, where there is a large trade in domesticated animals, to set up sanitary law against the perilous commerce in tubercular animals. Very few States control the butcher trade in small towns, where so many tubercular cattle are killed, or the trade along the public roads, or over railroads, intrastate or interstate.

The most conflicting views prevail in different States on tuberculin as a diagnostic agent. Tuberculin sold is often not standardized. What is sold is that from private companies, State laboratories, or United States laboratories. No wonder many tests are failures, when spurious material is sold for tuberculin. There is conflict of opinion in the various States on methods of diagnosing the disease: some requiring tuberculin; others permitting it; others not requiring it at all. There are diverse laws on the

control of the disease. The States seem to be all at sea as regards methods of control, some advocating the Bang method; others the slaughter method. There is much dispute as to the practicability of the Bang method for our agricultural conditions and much criticism of the costliness of the slaughter method.

There is lack of Federal control of the milk, butter, and general dairy trade in products which are well known to be liable to infection with the tubercle bacilli. Nor is there sufficient State or city control of the trade in milk and butter infected with tuberculosis. Private practitioners in the rural regions fear the loss of their clients, when tuberculosis is known to be in herds, and are willing to stand by their clients, though their scientific knowledge tells them they should not do so. The farm element often opposes control or suppression of tuberculosis by covering their knowledge of its presence in herds, either from disbelief in its infectiousness, from fear of losses by reduction of prices, or from fear of losses in sale of milk in the community.

The States in which sufficient authority is granted live-stock sanitary officers to control tuberculosis in the domesticated animals have not, as a body, risen to a lofty conception of the interstate and national significance of the disease, the consequence of which is a lack of unified feeling and unified opinion among State officers, taken as a whole, upon the largeness of the problem of control, of its national and continental bearings. The live-stock sanitary officers have not sat in continental convention upon the control of the disease, nor have the Canadas, nor Mexico, been invited to confer upon it.

Here the question may be asked, Are the domesticated animals in America so much infected as to necessitate such serious council? In reply we should say that tuberculosis is of the greatest moment as a live-stock sanitary problem in the United States, which may be discovered from even a cursory study of the situation.

V. The Prevalence of Tuberculosis among Domesticated Animals in the United States.

Precautionary sanitary legislation against tuberculosis of the domesticated animals in the United States is needed because of the wide prevalence of the disease and its undoubted increase among cattle and swine—the two chief kinds of food-producing animals. In speaking on the subject of the prevalence of animal tuberculosis we must freely admit, at the start, that, on account of the fact that many of the States are not given to taking accurate statistics of tubercular animals, our knowledge of the prevalence of the disease is imperfect. Nevertheless we have sufficient data to convince us that the disease is covertly, but markedly, advancing—so much as to cause alarm for the future.

We have, to sustain this opinion, three sources of evidence: namely, the evidence furnished by the United States Meat Inspection Service; the evidence furnished in the facts turned in to Washington from the States to which tuberculin has been for years distributed freely from the Federal laboratories; and, lastly, the evidence collected by State officers in their official capacity.

A short time ago Russell and Hastings, of the Wisconsin Agricultural Experiment Station, published statistics based upon a study of tuberculin tests of cattle in several States. They may be given here as illustration of the amount of infection in some quarters several years ago:

State	Number Tested	Number Tubercular	Percentage Tubercular
Vermont	60,000	2,390	3.9
Massachusetts	24,000	12,443	50.0
Massachusetts, entire herds	4,093	1,089	26.4
Connecticut	6,300	..	14.2
New York (1894)	1,200	163	18.4
New York (1897–1898)	34,000	4,800	14.1
Pennsylvania	2,500	..	21.4
New Jersey	929	..	12.0
Illinois (1897–1898)	3,655	560	15.32
Michigan	..	..	13.0
Minnesota	3,430	..	11.1
Iowa	873	122	13.8
Wisconsin Experiment Station herds	323	115	35.6
Wisconsin, non-suspected herds	935	84	9.0
Wisconsin, State veterinarian's tests (suspected herds)	588	191	32.5

Recent figures are not at hand to illustrate the increase in tuberculosis in these States, except New York. But figures from New York are interesting, intensely so, as it is by far the largest dairy State, having a total of 1,755,972 milch-cows. Between 1904 and 1906, in tests made under the direction of the commissioner in a large share of the counties of the State, the following results were obtained: 262 herds tested; 3088 cattle; 673 reacting; 21.79 per cent. tuberculous. Between 1905 and 1907 statistics were taken by private practitioners of tests covering most of the counties in the same State, with the following results: 364 herds tested; 8640 cattle; 3111 cattle reacting; 36 per cent. tuberculous. This warrants the conclusion that tuberculosis is wide-spread in the largest dairying State in the United States, and is rapidly increasing, and that, though but ½ of 1 per cent. of New York's cattle have ever been tested, all are more or less seriously affected.

The evidence furnished in the facts turned in to Washington from the States in which tuberculin has been for the last few years distributed freely

by the Federal government is also striking; for, whenever tuberculin was furnished to any point in the country by the Washington authorities, they always stipulated that the results of the tests should be sent to the capital for filing. In this manner a tally has been kept on the increase of tuberculosis throughout the country. From the statistics thus filed it has been determined that of all cows in different States throughout the country tested with tuberculin furnished by the national government, from 2.79 to 19.69 per cent. are tuberculous, as shown in reaction and slaughter.

Perhaps the evidence for safest judgment in the spread of tuberculosis among American cattle is furnished by the United States Meat Inspection Service. The government reports show that, from the year 1903 to the year 1907, there has been an increase in the number of cases of tuberculosis found in the post-mortem examinations, conducted in meat establishments by United States inspectors, from 0.169 per cent. in 1903 to 0.539 per cent. in 1907, that is, about three times as much. In swine the same conditions prevail, except that four times the amount of infection is found in swine that was found five years ago. It must be remembered that this amount of infection was discovered in the 8,000,000 cattle and 32,000,000 swine examined post mortem and coming from nearly every State in the nation. If anything, the increase of tuberculosis during the last five years among domesticated animals in the United States is greater than the percentages I have given would indicate; because the United States inspectors hold post-mortem examinations on only five-eighths of all cattle and swine killed in the United States per annum. The remaining three-eighths, or 30,000,000 animals, are killed without inspection, on the farms and under unofficial conditions, where nothing can be known of tubercular lesions among them.

In view of the evidence from State government and national government sources which has been presented, the conclusion cannot be avoided that tuberculosis is increasing rapidly among domesticated animals in America. We may, therefore, now properly consider:

VI. What has Been Done, or is Being Done in the Individual States Included in the United States, for the Control of Tuberculosis of the Domesticated Animals.

Though the question of animal tuberculosis has, for a long time, assumed the proportions of a national question, it has never been attacked by the majority of our scientists as a national question. The faultiness of this is self-evident; though there are numerous reasons, or what purport to be reasons, for delay—the subtly working, unobtrusive nature of the disease, whereby it is not known to be present; our ignorance of the extent of its prevalence; the staggering loss of treasure which would be the price of its eradication. Instead of assuming the burden nationally, we have left the

problem to be attacked by individual State governments and locally within the States.

The warfare against the disease has taken initiative, or has been dependent, perhaps, upon the accidental discovery of its presence in the State; perhaps upon the multiplication of municipalities, accompanied by an increase of human tuberculosis, and the belief that animal as well as human tuberculosis should be cudgeled; or the multiplication of dairies has drawn attention to a rapidly increasing animal tuberculosis; or the preference for pure-bred cattle some day reveals the presence of the infection among many of them. Though, usually, the warfare against the disease in the States or locally has been due to the influence of educated men, mainly veterinarians, whether State sanitary officers or not, who have become awakened to the extent of the disease among animals within the State boundaries, and, with every drop of missionary blood in their veins burning with zeal, have urged precautionary measures against it and all other dangerous communicable diseases.

Whatever manner the control movement has been initiated in the several States matters not, so long as this creditable work is done at all. In surveying the continent as a whole, to note what is being done against animal tuberculosis, the work presents remarkable geographic features. Consequently we may consider the States in groups according to their geographic situation.

The first group consists of the New England States—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

1. *Control Work Against Animal Tuberculosis in New England.*—This group of States, all of which were settled very early in the history of the country, together has the smallest area of any group of States in the land. Their early settlement, the intelligence of an academic sort which prevails in New England, would lead one to suppose that control work against animal tuberculosis would be of a high order. Contrary to such expectations, in a general way it may be said and must be admitted that proud New England is very backward in veterinary sanitary control work. There are numerous thriving manufacturing towns in this group of States, supplied by a multitude of dairies. Yet the sanitary laws are all very faulty, and laxity and incoördination in sanitary work prevail. The States do not work hand in hand to control the disease. Rather, there is no mutual understanding. One State seems to be halting for the other to do something. The live-stock sanitary boards, with the exception of Massachusetts, are not headed by veterinarians. The heads are all more or less conscientious. But what work is done is muddle-headed and stupid—rather that of political gamesters than of scientifically trained men. It is amusing to read some of the sanitary reports to the governors—the uneducated babble of farmers trying to make

out reports on the prevalence of disease. The New England universities are still too much engrossed with medieval and modern classical scholasticism to train veterinarians for the agricultural needs of the States. Hence the situation of affairs I have described.

Maine has a law, aimed at tuberculosis, in which appraisal of an animal is prohibited unless it has been owned in the State for three years. The purpose of the law is to discountenance the importation of tuberculous animals, instead of which it probably leads to the concealment of the disease by owners. The large city of Portland in 1906 got up in arms against the vending of tuberculous milk, the consequence of which was that tuberculin tests, made by the State Board of Cattle Commissioners, showed that 16½ per cent. of all cattle in the vicinage were tuberculous. The Board has a supposition that dairy cattle supplying other municipalities are similarly affected. The law requires that all pure-bred cattle imported must be tested under the order of the commissioners within thirty days after arrival. Pure-bred cattle sold within the State must be tested before delivery.

The report of the cattle commissioners of New Hampshire displays the absurd fact that a physical examination only, without the tuberculin test, is all that is required to pass animals into New Hampshire. Reimbursement is given in the State for animals found on physical examination to be tuberculous; that is, New Hampshire waits until the tuberculous animal has done its worst and is rapidly approaching death before it acts.

The live-stock sanitary law of Rhode Island is flimsy, inchoate, and superficial, though it cannot be believed that this law answers even for so pigmy a State as this. Apparently Rhode Island waits until there is a suspicion that a single animal is tuberculous before it rushes to act. Evidently the plan is similar to that of New Hampshire. The single bad animal, in a state of easily observed physical wreck, is all that is asked for. No tuberculin tests are required.

The law of Connecticut is a very poor one. The commissioner, who in his report shows very imperfect information on tuberculosis, and vents ideas totally in opposition to scientific truth, regrets that he has no State authority over sanitation of dairies. The reports for the last seven years show a gradually increasing number of condemnations for tuberculosis, and, it is added, "if the size of the counties and the number of neat cattle kept in each county are taken into consideration by reason of locality, it will be seen that no county can claim any appreciable freedom from bovine tuberculosis."

In contrast to these States, Massachusetts has an excellent system of live-stock sanitation, undoubtedly owing its present existence, its increasing usefulness, its wide-awake activity, its air of modernity and intelligence, to the chief of the Cattle Bureau of the State Board of Agriculture, Dr. Austin Peters, of Boston, who is a veterinarian of English training inured to Amer-

ican agricultural conditions. Animal tuberculosis in Massachusetts is looked after with knowledge of its nature, its seriousness, its destructiveness.

The work against the disease in that State has three aspects: First, the examination, condemnation, or releasing of animals held by local inspectors of the State under suspicion of being tuberculous. Second, the quarantine work against tuberculosis, which is a requirement of the State board. This has two parts—the testing for tuberculosis of all cattle brought into the three important quarantine stock-yards, Brighton, Watertown, and Somerville, in which class of cattle no certificates of tests made outside the State are accepted; and the testing of cattle brought to points just outside the quarantine stations. If these have had no test, they are injected at the owner's risk, in order that those tubercle-free may be sold in the yards. Third, the testing of entire herds by the board at the owner's request, with the object of eradicating tuberculosis from them. Fortunate in these three respects as Massachusetts is, its system is defective in that: first, there is no compulsory testing of cattle (herds) outside the three quarantine areas; second, there is no mandatory meat inspection; third, as the licensing of slaughter-houses, though obligatory, has proved farcical, much tuberculous meat is sold in large sections of the State.

2. *Control Work Against Animal Tuberculosis in the Atlantic States.*—Though, on the whole, control work against the disease in the Atlantic States—New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North and South Carolina—is better than in New England, much is left to be desired.

The abominable conditions in the State of New York have already been treated in another section of this paper. Only during the past winter was a Bureau of Veterinary Service instituted under the State Department of Agriculture, with a chief State veterinarian officially placed at the head with a good salary. The State requires the tuberculin testing of all cattle entering the State, except those coming with official certificates from other States. It tests, on request, cattle for tuberculosis, where this is suspected, and the owner may, at his option, adopt the Bang method for the perpetuity of his cattle, or submit to their slaughter and destruction, after an appraisement and award of all reacting cattle. However, there is no system of State meat inspection; no compulsory testing of cattle.

The work against animal tuberculosis in New Jersey is in the hands of the State Tuberculosis Commission. The law regarding the entrance of cattle into the State is similar to that of Pennsylvania. New Jersey gives free entrance to cattle, duly inspected in another State, when brought into that State. It accepts cattle duly tested by State agents, other than its own, provided a properly signed duplicate certificate is made out and sent to the commission for approval, accompanied by a copy of the tempera-

ture chart, duly signed by the authorized agent. If cattle, without such certificates, wish to enter, they must be held in quarantine at destination in the State prior to test with tuberculin. Tuberculous cattle are either turned back or destroyed at the expense of the owner without appraisal. Cattle within the State are tested on request and appraisal given tuberculous cattle, provided a veterinary physical examination be made at the owner's cost, prior to the State's tuberculin test in order to avoid unnecessary testing.

The banner State of the eastern part of the United States in the control of animal tuberculosis, as well as all other animal infections, is undoubtedly Pennsylvania. We may well expect the President of Section VII of this Congress to report the progress that that State is making in control work under his leadership; so I will not usurp his rights in that matter. However, in passing, I may say that because of the reign of sanitary law over the stock interests of Pennsylvania, the system of sanitary control which has been developed or the prevention of the entrance of tuberculous cattle into the State, the repression of the disease by adaptation of the Bang method to herds in the State, the inauguration of a State meat inspection service which is the envy of sister States, the establishment of a State laboratory of the live-stock sanitary board and an experimental farm for detection of disease, and the discovery of new sanitary methods, the State of Pennsylvania has been a model to us all. When it is remembered that live-stock sanitary control work was inaugurated during the incumbency of the present State veterinarian in 1895, thirteen years ago, in the establishment of the live-stock sanitary board, we marvel how much can be accomplished in so short a time. Dr. Pearson asserts that animal tuberculosis in Pennsylvania is decreasing in prevalence, which is to be expected. Municipal meat inspectors, butchers, pathologists examining cattle after tests, the United States veterinary inspectors, all state that animal tuberculosis is being curbed in the State. Dr. Pearson is brave enough to say that this restriction of tuberculosis will lead, in time, to a stage in the repression when the disease will be of little public health or economic importance.

In Delaware, on the other hand, we find a situation the reverse of that in Pennsylvania, for animal tuberculosis is there neglected. The defects in the sanitary law are obvious. A thousand dollars per annum is all that is appropriated for live-stock sanitary work. There is no live-stock sanitary board and no State veterinarian provided for. The execution of the law is placed solely in the hands of the governor of the State. The provisions of the law are inexplicit. No reference is made to tuberculosis. No compensation is allowed for the destruction of tuberculous cattle. The law was written in the days before tuberculin was known, and has never been revised.

The State of Maryland is one of those examples, at present, of a commonwealth containing a live-stock sanitary board with much power for the control

of tuberculosis, a capable State veterinarian willing to combat the disease; but the effectiveness of the law is nullified by insufficient appropriation of money for administration. The State veterinarian declares that bovine tuberculosis is the most serious and wide-spread disease he has to contend with in the State, and statistics show that 20 per cent. of all cows slaughtered in the State in packing-houses are tuberculous. Yet no money is granted by the State for appraisal in case of the discovery of tuberculosis in herds, and there is no way legally to prevent the entrance of tubercular herds into the State.

In Virginia there is no such thing as warfare by the State against animal tuberculosis, as the energies of the State veterinarian and the Board of Control are wholly engaged in the fight against Texas fever, which is believed to be the greatest menace to the cattle industry there. However, if the experience of Maryland, the neighboring northerly State, indicates anything, it is that Virginia is probably also badly infected with tuberculosis. There is only one reference in the Virginia law to the disease: "That the disease known as tuberculosis shall be classed as a highly contagious and infectious disease, and such measures shall be taken by the board and its authorized veterinarian as to them may seem necessary to eradicate and prevent the spread of said disease." This sentence will not save Virginia from bovine tuberculosis.

No statistical reports are published by the State of West Virginia, and I have not been able to learn anything of the prevalence of the disease in that State. Under the law the commonwealth is, for sanitary control work, divided up into sections embracing, in each, several counties. One consulting veterinarian is designated for each section, whose duty it is to visit each herd of pure-bred cattle and each herd of dairy cattle once a year to inspect for infections, including tuberculosis, and, if necessary, to test them. In case of tubercular infection the animals are appraised by laymen, slaughtered, and paid for pro rata, by certificate, according to the amount of infection. There are grave omissions of sanitary points in this law as it works out in practice. For instance, there is insufficient police power given against the importation of infection.

The North Carolina live-stock sanitary law does not have anything to say about animal tuberculosis. It is, however, so worded as to cover all contagious diseases among domesticated animals. There being nothing in the law touching tuberculosis, the conclusion might seem to be warranted that no bovine tuberculosis existed in the State—which is preposterous. North Carolina does not appraise animals having a contagion; simply compels condemnation by regular authority. Dr. Tait Butler, the State veterinarian, incidentally reported at the meeting of the Interstate Association of Live-stock Sanitary Boards, held in Springfield, Ill., 1906, that he was accustomed to test cattle in the State for tuberculosis on request of owners,

stipulating that reacting animals be sent to a slaughter-house to be examined post mortem by him. All cattle showing lesions are condemned and buried.

In South Carolina the State veterinarian, in order to separate healthy from unhealthy animals, may make tuberculin tests of herds, either at the request of the owner or whenever two or more reputable citizens shall notify him of the existence of a contagion. In either case the expense of the tuberculin test must be borne by the owner. In case of reactions, those animals are condemned and destroyed without appraisal either by burying or burning. The regulations do not make compulsory the notification of the existence of tuberculosis by the owner of cattle. However, when the veterinarian acts in the case of an infection, it is a penal offense to interfere with his entrance to premises, or to refuse to disinfect buildings occupied by the tubercular cattle. Few cattle have been examined for the disease during the last year or two, but the veterinarian is of the opinion that the test should be applied to all commercial cattle used for dairying.

3. *Control Work Against Animal Tuberculosis in the Southern States.*—In the States toward the southern portion of the United States—Florida, Georgia, Alabama, Mississippi, Kentucky, Tennessee, Texas, Louisiana, Arkansas—where the climate varies from warm temperate to almost semitropical, we find conditions among the people the reverse of active, energetic, or ambitious to live up to the tenets of medical science. We observe poorness of sanitary law or absence of sanitary law, backwardness in control work, or such indifference or laziness that none is done or even thought of. On the other hand, in some cases we find States doing strenuous control work with creditable results. In every State there is need for work against tuberculosis, because the observations of veterinarians have detected the prevalence of the disease.

The first of the States, Florida, is in a deplorable condition as regards control work against animal tuberculosis. There is a ridiculously inconsequential section in the old law instituting a State board of health, providing for the suppression of contagious diseases of animals, particularly the domesticated animals. The officers of the board have sent me copies of the statute reports and letters acquainting me with the situation. The State board of health keeps in its service a veterinarian who investigates cases of infection reported to him. The calls that he has had show that bovine tuberculosis is rampant in the cities, like Tampa, calling for the test. However, there being no test requirements; no obligation to report disease; no provisions for the disposal of carcasses, the law is farcical.

Georgia is no better. Only as late as 1905 was provision made for a State veterinarian to be called in outbreaks of infections. The law of 1905, and that of 1899, are flimsy, primitive affairs, so short as to contain two or three general statements covering only a page or two of print. Under the law of

1905 the State veterinary surgeon is called in consultation, in case infection is reported, "by the ordinary of any county in this State, or upon application of the county commissioners in this State." The commissioner of agriculture writes me that live-stock sanitation is in its infancy, and that the State board of health has never issued anything on the subject. What an elysium for tuberculosis Georgia is!

Alabama has a most excellent live-stock sanitary law, passed March, 1907, by the efforts of Dr. C. A. Cary, the designated State veterinarian. The law is recent; but the regulations based on the power given in the law have been published and are now operative. They require: reporting of tuberculous cattle to the State veterinarian; killing of tuberculous cattle under the supervision of a city inspector, or at other places under the eye of the State veterinarian or of his assistant. The use of tuberculous cows in dairies is forbidden, and the importation of tuberculous cattle also, without the tuberculin test. Heavy penalty is set for breach of the law.

Little can be said of Mississippi. She has no live-stock sanitary laws touching tuberculosis; no live-stock sanitary board; no State veterinarian. Bills for live-stock sanitation have been introduced into the legislature every year for twelve years, without passing.

There is a statute relating to the control of infectious diseases of animals administered in Kentucky by the State board of health through the good offices of a State veterinarian, Dr. F. T. Eisenman, of Louisville. The law is weak; but the veterinarian is a duteous and daring man who lays hold fully of all power allowed him. The statute does not permit him to prevent the importation of tuberculosis of a bovine kind; nor restrict bovine tuberculosis in the State. But the veterinarian is constantly and valiantly reporting to the State board of health the state of things in the dairies of Kentucky, which are horribly infected with bovine tuberculosis. The horrors of animal tuberculosis in Kentucky may be illustrated as follows: An examination of the herd of the city almshouse of Louisville in 1906 showed a reaction of 56.8 per cent. Dr. Wyman's tests in Covington gave a much higher average percentage than this, and higher too than Shelbyville, which gave an average of 18.66 per cent. The State veterinarian feels assured that 30 per cent. of all cattle supplying milk to most cities of the State are tuberculous.

No control work against animal tuberculosis is done by the State authorities in Tennessee. The law provides for a live-stock inspector acting under the commissioner of agriculture, and county live-stock inspectors acting under the county boards of health, none of whom are veterinarians. The statute requires the reporting of existence of communicable diseases of animals and forbids the importation of animals with infectious diseases. But the report of the commissioner for 1906 is brief to the point of absurdity, and clearly indicates that nothing is being done except against Texas fever.

Texas has no law controlling animal tuberculosis. This State, which is as large as half a dozen of the larger countries of Europe and more, which has immense ranches and millions upon millions of cattle, is so backward in sanitary matters that it can afford to pay the pittance of $1200 per annum to a veterinarian to do its sanitary control work, who is a private practitioner giving what time to the State he thinks that he can afford. This man, Dr. W. G. Langley, informs me that, early in 1908, he tested with tuberculin over a thousand head of cattle, and found in some of the herds that the percentage of reactors was alarmingly high. He is trying to get a State appropriation for the testing of cattle without expense to the owners, but giving reimbursement for tuberculous cattle.

Tuberculosis is not deemed to be a very important part of the sanitary control work in Arkansas, though there seems to be no question, from recent investigations, that the disease is prevalent enough in the State. There is opportunity offered in the law passed in 1905 and 1907 for work against the disease by the veterinarian of the agricultural experiment station, Fayetteville, who has the work of the State in hand. His sanitary work at present is chiefly against Texas fever, though he deputizes veterinarians in case other infections make their appearance. The cities, notably Fort Smith and Little Rock (the capital), are taking up the matter of the sanitation of dairies and examination of cows for tuberculosis. Little Rock did so on the advice of Dr. Lenton, the State officer, who found 80 per cent. of infection in the cows supplying the State lunatic asylum and the blind and deaf-mute institutions.

In Louisiana that stout-hearted and strong-minded veterinarian, Dr. W. H. Dalrymple, reports that there is at present, sanitarily, chaos. The State board of health has the power to curb infections in domesticated animals, such as tuberculosis and anthrax, if it could get sufficient appropriations of money to do so. However, there are two bright spots in the sanitary outlook—the cities, such as Shreveport, Alexandria, and New Orleans, have good meat and milk inspection ordinances, including articles against tuberculosis. Dr. Dalrymple took occasion, recently, to recommend that the ordinance used by Shreveport be adopted by all the smaller municipalities in the State. The Louisiana board of health has advised the passage, by the legislature, of a food and drug bill, which it has composed, having meat and milk hygiene stipulations.

4. *Control Work Against Animal Tuberculosis in the Central States.*—The central States—Ohio, Indiana, Michigan, Illinois, Wisconsin, Minnesota, North and South Dakota, Kansas, Nebraska, Iowa, Missouri—contain a large share of the best farm lands and breed a large share of the best farm animals in the United States. Most of these States are notable for excellent live-stock sanitary laws, for live-stock sanitary boards which are composed of

liberal-minded men, many of whom are veterinarians, for scientific men in control who are keenly aware of the usefulness of the sanitary work and zealous in carrying it out for the amount of sanitary work done, for the kind of work done. Indeed, some of these States in these regards have been examples to the rest of the country. The bad features of the operation of sanitary law in this region are: the variance of the laws; there is no coöperation of these States as a group; there is sometimes a lack of scientific courtesy among the sister States in the operations of the laws.

Ohio has a splendid system of live-stock sanitation, which is, however, faulty in that not enough attention is paid to animal tuberculosis. Testing for the disease is permissive rather than mandatory. Still, when an owner agrees to have tests made by the State, he is obliged to kill and burn or sell for fertilizer all reacting animals and to disinfect premises most thoroughly. Numerous farmers in the neighborhood of municipalities are calling for the free test of their herds by the State, for the reason that these cities, of which Ohio has many, are demanding tubercle-free herds in the dairies.

Indiana live-stock sanitary law is brief and as free as possible from official machinery and red tape. By the State Board of Health is administered the food and drug law, which has meat and dairy articles drastic and severe. Indiana is sectioned off by the board of health, and to each section is assigned a food inspector, part of whose duty is to look out that the products of infected animals are not used in dairies. Inasmuch as the regulations of the live-stock sanitary law forbid tuberculous animals from being used in dairies, an opportunity is given the State veterinarian to get reports from food inspectors and to dispose of tuberculous animals under the law. These are held to be worthless, except for fertilizer; a nominal fee of two dollars being all that is allowed for them if condemned.

Michigan claims, probably not correctly, that over 80 per cent. of the other States have copied her sanitary law. However, its statute undoubtedly is a noble one, and it is obeyed, chiefly because of its heavy penalties and the known severity of Michigan justice. There is no appraisal for animals allowed when they are tuberculous, nothing being granted from the State funds for tuberculous animals. The live-stock sanitary commission claims that very little tuberculosis exists in the State. This is unquestionably erroneous, as the dairies which supply cities like Detroit probably contain much of the disease. The fault of the Michigan law is that too little scope is given the veterinarians and too much to laymen—the veterinarians are but the instruments of the commissioner. Veterinarians under it have too little initiative. The requirements in the Minnesota law for the persons who shall sit upon the board should be adopted in a revised Michigan law.

Illinois unquestionably has an average of 25 per cent. of all dairy animals infected with tuberculosis. Examinations of herds in State institutions

have given a still higher percentage. Yet the State has but few veterinary inspectors in its employ—only in Chicago and East St. Louis, I believe, where attempts are made to separate the sick animals from the healthy and to prevent their disposal within the State without State inspection. Illinois is greatly in need of a law giving this inspection at every point in the State where slaughter of animals takes place. Testing of animals for tuberculosis is not obligatory. No funds are provided to pay for infected animals when they are found as a result of the test.

The State of Wisconsin is carrying on a noble warfare against bovine tuberculosis at the instance of the live-stock sanitary board, the State veterinarian and the bacteriologist of the State College of Agriculture sitting on the board. Its law is one of the wisest cattle laws in the country. The details of the law need not detain us. Suffice it that ample power is allowed to prohibit importation of infected stock; to require notification of infection within the State; to force tests by State officers, condemnation of the tuberculous, and just appraisal. Wisconsin was the first to introduce the method of shipping reacting cattle to abattoirs to be examined post mortem by United States officers, at the option of the owner, the judgment of those officers being final. The owner in this case receives the net proceeds of the sale. In case he refuses to have such a herd shipped for slaughter and post-mortem, he must submit to having his herd held in quarantine as the State board may direct.

Minnesota is not one of those States which require the testing of cattle for tuberculosis, otherwise its sanitary officers are carrying on a notable and clear-headed fight against the disease. She is efficient in her work to prevent further importation of the disease, while requests for tests are increasing, owing to two important phases of the warfare—namely, her great cities, like Duluth, St. Paul, and Minneapolis, are forbidding milk to be sold from tuberculous dairies, and the State is encouraging testing by allowing a liberal award for condemned animals.

The year 1907 witnessed the passage of a law in North Dakota establishing a live-stock sanitary board, providing for a State veterinarian as executive officer, the veterinarian of the State Agricultural College for bacteriologist, and for assistant state veterinarians, all under ample pay. The regulations established require dairy and breeding cattle imported to show certificates of tuberculin test and compel testing of cattle within the State to be inaugurated in case of suspicion of tuberculosis. The State board in Bismarck, the capital, September, 1907, passed a resolution praying the United States Secretary of Agriculture "to establish such regulations as he may deem necessary to prevent the interstate shipment of tuberculous breeding and dairy cattle"—a remarkable petition.

Of Iowa it must be said that its sanitary leaders have adopted two pre-

cautionary sanitary measures against animal tuberculosis and have in mind another wise policy for the same purpose. Breeding and dairy cattle entering the State must show certificates of tuberculin test. Suspicious cattle are compulsorily tested. Every owner of a creamery, before delivering any skim milk to any person, must cause the same to be pasteurized at a temperature of 185° F. The State Board of Health recommends that all breeding and dairy cattle be tested with tuberculin at intervals of a year until herds are free from tuberculosis; that every dairyman and breeder be required to see that his purchases are free from tuberculosis, as ascertained by the tuberculin test. A definite, model milk and dairy ordinance has been printed and recommended for each town or village in the State.

Kansas does not require the reporting of cases supposedly tuberculous. Nor are there any appropriations of money for suppression of the disease. The control work against animal plagues, unfortunately for Kansas, is, under the law, placed in the hands of a live-stock sanitary commissioner, evidently a whilom farmer, who does his best, according to his restricted light, to control disease. Few cases of suspected tuberculosis are reported. When there are cases, the "department" furnishes the tuberculin and the tests are made either by a man delegated by the commissioner or by a man from the State Agricultural College.

There is a sentence in the Nebraska law preventing the importation of cattle or any domestic animals having infectious diseases; but the law is largely inoperative, as there is no provision for its enforcement by the legislature. Reporting of tuberculosis in cattle is not required, though, according to the last report of the deputy State veterinarian, notification of the presence of the disease was given by twenty-two counties. The State veterinarian is of the opinion that there should be a periodic test of all animals supplying milk to creameries in the State. The disease is rapidly increasing in the State in both cattle and hogs, according to the inquiries of the State University. There is no tuberculin test of cattle supplying cities, except Omaha.

Tuberculosis, the State reports say, is rapidly increasing in the State of Missouri. The State veterinarian writes: "There is already a sufficient number of tuberculous cattle in the beef and dairy herds of the State to guarantee the rapid spread of the disease in the future." Much power of quarantine is given the State board of agriculture, namely, to quarantine against any other State or territory; to quarantine any municipality in the State; to quarantine any barn, pen, store car, yard, or field, any of which are capable of infection. But no separate and definite specifications are made in the law against tuberculosis. The State dairy commissioner is advocating the passage of ordinances by all cities, requiring certificates of health for dairy cattle. Two cities, Carthage and Joplin, have done this. The State

veterinarian is advocating: first, a tuberculin test of all dairy cattle and indemnity for the tuberculous; that cities be empowered to provide ordinances for meat and milk inspection; that State inspectors be placed in the three State stockyards to prevent diseased cattle from being sold in the State.

5. *Control Work Against Animal Tuberculosis in the Rocky Mountain and Pacific States.*—Persons in the Rocky Mountain States who are interested in live-stock sanitation, as a rule, have found little response to appeals for legislation against animal tuberculosis. At all events, the sheep industry and the range cattle industry have so much engaged the attention of stockmen that questions bearing on the health of dairy cattle have been generally neglected. This is undoubtedly folly, as the State veterinarians are beginning to note the great prevalence of tuberculosis in many parts of those States, and are beginning to bewail the absence of sufficient sanitary law against the disease.

Colorado has been, for several decads, the Mecca for persons afflicted with tuberculosis. Yet animal tuberculosis in the State is only just now attracting any attention. The testing of cattle entering the State for tuberculosis is not required; nor is the test required for cattle supplying milk to Colorado cities and towns, with the exception of Fort Collins and a few others. A movement seems to be afoot to obligate dairymen to have all their cows tested and to keep them tubercle-free. The stock inspection commissioners have passed a regulation that all cattle tested and found to be tuberculous by veterinarians must be branded with a perpendicular mark three inches long on the forehead between the eyes. Colorado has a law and regulations governing the slaughter and inspection of animals in the State for food. Only one meat and slaughter-house inspector has been appointed, which will make the law largely inoperative.

Wyoming requires a certificate of health for breeding and dairy cattle to be imported into the State, showing that the cattle have successfully passed the tuberculin test at the hands of a responsible veterinarian. The live-stock law mentions specifically the kinds of diseases of animals for which indemnity is possible; but no reference is made to tuberculosis. Sanitary law is imperfect in Wyoming when compared with the more advanced States; though the present law in a general way gives sufficient power for the control of contagions among animals.

From a live-stock standpoint one of the most interesting States in the whole west is Montana. Almost all the towns therein, of over five thousand inhabitants, have milk and meat inspection ordinances, requiring the services of a skilled veterinarian for their administration, which will go a long way to help control of animal tuberculosis. Breeding and dairy cattle must show certificates of tuberculin test before entrance to the State is allowed. The tuberculin test is given on request to all cattle from sections of the common-

wealth; though, unfortunately, from lack of appropriation, during the last year or two not all of these requests have been granted. No indemnity is allowed in Montana for animals found tuberculous; though option is given the owner, either to furnish bond that he will pursue the Bang method for control of the disease in his herd, or, the animals being slaughtered, all carcasses, except those showing very minor lesions, must be buried or burned. There also must be strict stable disinfection.

Utah has no State veterinarian; no live-stock sanitary board concerned with bovine tuberculosis; no State sanitary law controlling the disease. It is prevalent, however, as attested by the veterinarian of the State experiment station, who, on request of local boards of health, has made tests and condemned animals for the disease during the last two years.

The major portion of the time of Idaho stockmen is given to sheep. The State veterinarian feels sure that there is hardly any bovine tuberculosis in the State. The law has only been in operation since 1905. Any animal found affected with an incurable disease is deemed to have no property value and no indemnity is allowed. The meat, milk, and skin of animals having an incurable disease must not be sold or otherwise disposed of under penalty. There is a prohibition of importation of affected stock.

Animal tuberculosis is given the most important place in the law of Washington, when it is written: "He [the State veterinarian] shall have general supervision of all contagious and infectious diseases among domestic animals within or that may be in transit through this State, and he is authorized and empowered to *inspect and test* all cattle within the State for tuberculosis." All cattle brought into the State, over six months of age, for breeding and dairy purposes, must have presented with them a certificate attesting their freedom from tuberculosis. It is the disease most frequently found in the cattle of Washington.

Live-stock sanitation could hardly be worse than it is in Oregon. Correspondence with the governor, and with his appointee to do the State work, elicits the fact that the work is all well nigh in abeyance.

The question of live-stock sanitation in Nevada is something of a joke. The State is devoted to mining. The population is very sparse. The agricultural interests are confined to one small corner of the commonwealth. An act was passed in 1905 appointing a State veterinarian and defining his duties. Under the law, whenever tuberculosis is discovered on any farm, the owner must submit to the regulations imposed by the State officer. Condemned tuberculous animals must be burned or buried. But, as there is no penalty imposed, and as the State veterinarian has never printed a report, so the Secretary of State tells me, of any findings, the statute must not be taken too seriously. Farming in Nevada is nearly confined to sheep-raising, and sheep are seldom tuberculous.

In California live-stock sanitary work is admirably conducted, though, as pointed out by the State veterinarian, there are many defects in the law. Tuberculosis is acknowledged to be very prevalent on many dairy farms in the State, yet the department has made no systematic effort, as such, to combat it, owing to the fact there have been no appropriations for the work. By the efforts of Dr. Keane, the State officer, California passed a law in 1897 permitting the passage of ordinances by the counties to establish, through the boards of supervisors, county live-stock inspectorships for the prevention of disease of live-stock and the supervising of the work of creameries. Many counties have undertaken the work, which has aided much in the control of tuberculosis and other infections. San Diego has such an ordinance, requiring, among other things, absence of tuberculosis from dairy animals.

6. *Control of Animal Tuberculosis in the Southwest of the United States.*—The laws of the southwestern States and territories are not essentially different from the statutes of other States further north. The expectation would be that, as this region is the El Dorado of tuberculous patients, no bovine tuberculosis would be found in this region. Yet reports from the region point out the existence of animal tuberculosis here as elsewhere. There is no part of these United States where animal tuberculosis does not exist, no climate free from it at present.

Oklahoma's efforts are, on the face of the reports, directed against Texas fever rather than against diseases like tuberculosis. Under the law, the live-stock sanitary commission parcels up the State between three veterinary live-stock inspectors (or rather such seems to be the import of the law) who are accountable for the sanitation of the region, both to keep infection out and to suppress it within the district. They can deputize persons to examine animals intended for slaughter within the region and rule on the disposal of the condemned. Probably little is done against tuberculosis.

The territory of New Mexico has an excellent code of sanitary laws administered by a body of laymen called the cattle sanitary commission, who employ a veterinarian, under the law, to take charge of the sanitation. Strict regulations are in force pertaining to importation, movement of cattle within the territory, suppression of contagion when it exists, indemnity, and disposal of carcasses. A tuberculin test is required before cattle can enter the territory. If a certificate is not shown at entrance, a test of cattle is made at the owner's risk and at his expense. Tuberculosis is one of the two diseases specifically mentioned in the sanitary law, hence it must be of importance in the territory. No indemnity is paid for cattle tubercular when brought into the territory, though these cattle are condemned and destroyed. Albuquerque, the capital, has a strict milk and meat ordinance against tuberculosis, and Las Vegas will presently follow the lead of the capital city.

It is with pleasure that I report the state of sanitary affairs in Arizona. That territory is, and may well be, proud of its attainments in live-stock sanitation. It has a body of live-stock sanitary laws which are stringently enforced, covering every necessary point in modern sanitation of animals. The board is enlightened and hearkens to the voice of that public-spirited man and most capable veterinarian, Dr. J. C. Norton, of Phœnix. From Maricopa County, which is by far the largest county,—indeed, the only county where the cattle industry is of much account,—tuberculosis was entirely eradicated at great expense in 1894 and 1895, and tuberculosis has caused no losses during the last two years. One of the main reasons for the success is that the disease was eradicated when its area was very limited—a lesson to sister States and territories, where large sums of money are expended annually because of neglect of tuberculosis. No doubt one of the reasons for the success of the territorial live-stock sanitation is that the territory is very liberal to the members of the board and the territorial veterinarian. In addition to his salary, which seems ample, under the circumstances, the veterinarian is allowed under the law ten cents for every mile he travels while on duty.

VII. Critique of Conditions and Some Suggestions for Their Amelioration.

The conditions, as regards tuberculosis among domesticated animals in the United States, are nearly those of anarchy—each State and territory doing what seems good in its own eyes, or doing nothing, as the case may be.

The explanations for these anarchical conditions are as follows:

1. The country is a new one and agricultural conditions are still unsettled in the extreme.

2. Sanitary law is but a thing of yesterday. Sanitary laws of any consequence or usefulness against contagious or infectious diseases were nearly unknown before 1884, when the great European scourge, pleuro-pneumonia, broke out in this country. Following the creation of the United States agency against animal infections—the Bureau of Animal Industry—came the initiation of live-stock sanitary law in the individual States.

3. Many of the live-stock sanitary laws are imperfect or untried. In sanitary practice grave omissions are revealing themselves in these documents.

4. Many States have primitive live-stock statutes covering tuberculosis. Others have no statute covering the disease; or, still worse, statutes which, because they are contrary to the State constitutions, or because they carry with them no appropriations of money to keep up the work or to begin it, or have no penalty which can be legally imposed or which is insufficient, are inoperative.

5. Some of the States which have no statute are unaware that bovine tuberculosis is spreading rapidly in them. They remain so until an accident, perhaps,—for example, examination of herds belonging to the State government,—reveals the alarming extent of the disease.

6. Many of the States which have excellent statutes have not full and absolutely reliable information on the exact amount of the infection. No State has thoroughly searched out, and accurately mapped out, the amount of tuberculosis present in it.

7. There has never been a thoroughgoing popularization of the simple and easily understood facts about tuberculosis among domesticated animals, as has been done in parts of Europe.

8. The States have taken up the task of combating tuberculosis single-handed and have so gone on from year to year; whereas, so grave tubercular infections as have manifested themselves would require conferences of sanitary authorities in neighboring States on the disease and the crusade against it.

9. The joining together, voluntarily, of the live-stock sanitary officers of the different States into a permanent association for counsel is a thing of but a few years' growth. This association, called "The Interstate Association of Live-stock Sanitary Boards," has, as a nucleus, members from only a few States. Being consultative, advisory, and voluntary only, and being at present an embryonic organization for sanitary counsel, it has never been able to take up the question of tuberculosis with satisfactory poignancy and authority.

10. The question of warfare against tuberculosis of the domesticated animals has never been made a matter of national conference. Nor has the united power of the individual States and the United States been pitted against it, as has been done in the case of pleuropneumonia, foot-and-mouth disease, and Texas fever.

Suggestions for the Amelioration of these Conditions.

1. The veterinary organizations, the State or territorial veterinary officers, and other influential veterinarians who are informed on local needs or conditions, should enlighten the people by every means possible on defects in the sanitary law, and should not scruple to copy the main features of the best live-stock sanitary laws, such as Michigan, Wisconsin, Pennsylvania, Minnestoa, or Arizona, to the end that model laws against tuberculosis may be in operation.

2. The existence or absence of tuberculosis among domesticated animals in each State or territory should be gaged by veterinary graduates and its extent determined by the State authorities. Maps should be made showing the topography of animal tuberculosis in each State. Dr. Mohler made,

provisionally, such a map for the United States showing the worst points of infection, and Dr. A. T. Peters has done the same thing for Nebraska. We should know where the enemy is and how great his strength before we can carry on a successful warfare.

3. Brochures should be written giving the simple and easily understood facts about bovine tuberculosis, in a few hundred words, expressly for breeders and animal husbandmen generally. These, by common agreement between the United States authorities and the authorities of the individual States, should be given the widest publicity in all the currents of the press and the widest circulation as pamphlets. Technical jargon will not do in such brochures. The papers must be terse, concise, simple.

4. The State live-stock sanitary authorities, lay and veterinary, in each State and territory, should, by might and main, be induced to enter into the work of the Interstate Association of Live-stock Sanitary Boards. This Association, when so enlarged, or when the majority of such authorities are represented, should take up earnestly the question of animal tuberculosis as a national question, vital to each State and territory, and urge, in every practical manner possible, serious and speedy work against it.

5. The National Association for the Study and Prevention of Tuberculosis under the auspices of which this year the International Congress on Tuberculosis meets, should have a permanent section on tuberculosis of animals and its relations to man, the members of which should be, as far as possible, the national and State veterinary authorities and all others interested in animal tuberculosis as a national problem. This adjunct section could do much to centralize and unify endeavor against tuberculosis of the domesticated animals.

6. The time is ripe for a first conference of the national veterinary authorities of the United States and the State veterinary authorities of the individual States and territories, to consider and advise on the whole problem of tuberculosis of animals on the American continent. Mexico and Canada should send national and provincial representatives to confer upon international phases of the infection. These conferences should be upon the legislative, economic, and sanitary sides of the problem, and should be eminently calm and wise. At such a conference such questions as that of the prevention of interstate trade in tubercular animals and the like may be mooted. The first conference should be followed by others, either bienially or trienially, all to be fully reported.

VIII. What May be Done in the Future in the United States of North America Against Tuberculosis of the Domesticated Animals.

At present sanitarians of North America are convinced that the preponderance of evidence points to the capability of the transmission of bovine

tuberculosis to man. The chances are so great that precautionary sanitary legislation, following the resolutions of several International Congresses on Tuberculosis, has, in the individual States composing the United States, been passed against the disease in the domesticated animals. The course legislation and governmental control will take in the future will depend on whether approximate unanimity can be reached on the question of intertransmissibility of bovine and human tuberculosis. Even if it should be finally determined that the possibility of the transmission of bovine tuberculosis to man is very slight, or naught, we have overwhelming evidence of the intertransmissibility of bovine tuberculosis among the other domesticated animals. This, in itself, will continue to engage the attention of legislatures and lead to the perfecting of live-stock sanitary law as a precautionary means.

Whether there is danger of transmission of bovine tuberculosis to man or not, the American people are unalterably against the use of badly infected carcasses for food or the milk of tubercular animals for food. This also causes the enaction of sanitary law. For sanitary, as well as economic reasons, therefore, live-stock sanitary law is bound to be more perfected.

As the disease, tuberculosis, is far more ruinous to live-stock than pleuropneumonia of cattle, which was controlled in America and stamped out, so we will eventually proceed against tuberculosis through the United States government agencies and the agencies of the governments of the individual States included in the United States as we did against pleuropneumonia. It was the alarm among the American people caused by the peril to the live-stock industry from pleuropneumonia which originated a large share of our present live-stock sanitary laws. The peril of tuberculosis, when well understood, will bring into being laws and will rejuvenate or perfect old ones.

The American people have inherited the legal and governmental genius of the Teutonic race. In the composition of live-stock sanitary law they have had to adapt themselves very rapidly to the new agricultural conditions of the western world. The people of the United States have displayed invention in statutory law, legal originality sufficient to meet all public needs. They will make no failure, eventually, in the matter of live-stock sanitary law for the successful control of tuberculosis of the domesticated animals. The control of animal tuberculosis over a whole continent is a colossal problem; but mutual coöperation of the States in the movement, uniformity of plan, and a common agreement having been obtained by periodic, national conferences of live-stock sanitary officers, the systematic work resulting therefrom ought to make us successful combatants against the disease in domesticated animals.

Vorbeugende gesundheitliche Gesetzgebung gegen die Tuberkulose der Haustiere in den Vereinigten Staaten.—(HUGHES.)

In Amerika herrscht eine allgemeine Uneinigkeit bezüglich der Ansichten Koch's, welche die Gefahr der Tiertuberkulose den Menschen gegenüber verkleinert, und welche das Resultat von Resolutionen früherer internationaler Kongresse, die Durchführung eines grossen Teiles vorbeugender Gesundheitsgesetzgebung gegen Tuberkulose der Haustiere in den einzelnen Staaten, aus denen sich die Vereinigten Staaten zusammensetzen, zur Folge gehabt hat. Die Herausbringung und Durchführung dieser vorbeugenden Gesundheitsgesetzgebung war von vielen Schwierigkeiten begleitet, die hauptsächlich in der Neuheit des Landes, Ungewissheit über die Ausdehnung der Infektion und Mangel an einmütiger Arbeit der tierärztlichen Beamten in den verschiedenen Staaten, die bei der Fehde in Betracht kommen, ihren Grund haben. Bei Betrachtung der Frage des Kampfes gegen Tiertuberkulose in den einzelnen, in den Vereinigten Staaten eingeschlossenen Staaten, vom Standpunkte der Gesundheitsgesetze, und deren Anwendung müssen die folgenden Bedingungen wahrgenommen werden.

1. Tierärztliche Gesundheitsgesetzgebung gegen Tuberkulose der Haustiere ist vergleichsweise eine Neuheit in den Vereinigten Staaten.

2. Viele der Gesundheitsgesetze zur Erhaltung des Lebens sind sehr unvollständig oder in der Handhabung unversucht.

3. Viele Staaten haben primitive, andere gar keine Lebenserhaltungs-Gesetze, noch andere haben kein Geld vorgesehen, um die Gesetze, die sie haben, durchzuführen.

4. Viele Staaten sind sich der Ausdehnung und des Überwiegens der Krankheit nicht bewusst; andere wissen überhaupt nicht, dass sie existieren.

5. Es ist niemals auf Grund einer grossen fortschreitenden Aktion die Kenntnis der einfachen Tatsachen über Tiertuberkulose unter den Massen verbreitet worden.

6. Die Staaten haben den Kriegszug gegen die Tiertuberkulose auf eigene Faust anstatt auf Grund einmütigen Zusammengehens unternommen.

7. Der Versuch, alle Gesundheitsbeamten in einer einzelnen Vereinigung zu gemeinsamer Beratung und Aktion gegen Infektionen wie Tuberkulose zusammenzubringen, ist bis jetzt nur von einigen wenigen Staaten unternommen worden.

8. Die Frage des Kriegszuges gegen die Krankheit ist nie ein Gegenstand nationaler Beratung aller interessierten Beamten der Bundesregierung, der Staaten und der Städte gewesen.

Für die Verbesserung dieser Bedingungen sind die folgenden Punkte in Betracht zu ziehen:

1. Die Bevölkerung der einzelnen Staaten sollte auf die Mängel in den

Gesundheitsgesetzen aufgeklärt werden durch tierärztliche Organisationen, Beamte und einflussreiche praktische Tierärzte. Die besseren Gesundheitsgesetze sollten von den Staaten, welche ungenügende haben, nachgeahmt werden.

2. Die staatlichen Autoritäten sollten die Ausdehnung der Tiertuberkulose innerhalb ihrer Grenzen ausmessen.

3. Erzieherische Blätter und Broschüren sollten geschrieben werden, um das Volk über das Überwiegen und den Ernst der Krankheit zu informieren.

4. Die tierärztlichen Autoritäten aller Staaten sollten sich zu einer gemeinsamen Organisation gegen die Krankheit vereinigen.

5. Die nationale Vereinigung für das Studium und die Verhütung der Tuberkulose sollte eine ständige Abteilung haben, die sich mit der Tiertuberkulose und ihren Beziehungen zum Menschen beschäftigt.

6. Es sollten augenblicklich in einer kontinentalen Konferenz über Tuberkulose die Delegaten der Vereinigten Staaten, Mexikos, und Canadas zusammentreten. Wenn diese Vorschläge gehandhabt werden, würde Übereinstimmung in tierärztlicher Gesetzgebung in den einzelnen Staaten gegen Tiertuberkulose das triumphierende Resultat sein.

Législation sanitaire préventive contre la Tuberculose des Animaux domestiques aux États-Unis.—(HUGHES.)

En Amérique, on ne partage guère les vues de Koch sur la transmission par l'animal à l'homme de la tuberculose: aussi, se conformant aux résolutions votées par lés précédents Congrès internationaux, plusieurs des États composant les États-Unis ont-ils promulgué un certain nombre de lois sanitaires préventives contre la tuberculose des animaux domestiques.

Cependant le passage et l'application de ces lois ont rencontré bien des difficultés dues principalemente à la jeunesse du pays, à l'incertitude où il semble être de l'étendue de l'infection, et à l'absence de coöperation de la part des officiers vétérinaires dans les nombreux États qu'intéresse la lutte contre la tuberculose.

Si l'on considère la lutte contre la tuberculose animale aux États-Unis par rapport aux lois sanitaires et à l'administration, on remarquera les conditions suivantes:

1. La loi sanitaire vétérinaire contre la tuberculose des animaux domestiques est, relativement, une nouveauté aux États-Unis.

2. Beaucoup des lois sanitaires concernant le bétail sont très imparfaites ou bien n'ont pas été appliquées.

3. Beaucoup d'États ont une législation du bétail trop primitive; d'autres

n'en ont aucune; d'autres encore n'ont pu voter aucune subvention pour la mise en exécution des lois qu'ils possèdent.

4. Beaucoup d'États ne se rendent pas compte de l'étendue des ravages de la tuberculose; d'autres semblent même ignorer qu'elle existe.

5. Il n'y a jamais eu, dans les masses, une vulgarisation assez étendue des simples faits de la question de la tuberculose animale.

6. Les États n'ont pas entrepris la guerre contre la tuberculose animale conjointement, mais individuellement.

7. Très peu d'États onts encouragé les efforts tentés pour réunir les officiers sanitaires du bétail en une seule association, dans le but d'échanger des idées et de faire cause commune contre des infections telles que la tuberculose.

8. La question de la lutte contre cette maladie n'a jamais été le sujet d'une conférence nationale de tous les officiers intéressés, dans la nation, les États et les municipalités.

Il est plusieurs remèdes à ces diverses conditions:

1. Les sociétés vétérinaires, les officiers de santé, les médicins vétérinaires influents devraient éclairer les populations des divers États sur les défauts de leurs lois sanitaires. Les États mal servis sous ce rapport devraient copier les lois des États mieux pourvus.

2. Chaque État devrait mesurer officiellement l'étendue des ravages de la tuberculose animale sur son territoire.

3. On devrait publier et distribuer des fascicules, des brochures, pour révéler aux populations la fréquence et la gravité de la maladie.

4. Les autorités vétérinaires de tous les États devraient former une grande association contre le fiéau.

5. L'association nationale pour l'étude et l'extinction de la tuberculose devrait avoir une section permanente s'occupant de la tuberculose animale et de ses rapports avec l'homme.

6. On devrait réunir immédiatement un congrès continental de la tuberculose animale, où les États-Unis, le Canada et le Mexique enverraient leurs délégués.

Si les suggestions précédentes étaient suivies, on obtiendrait un résultat magnifique, l'unité, dans tous les États, de la législation vétérinaire contre la tuberculose animale.

SURVIE ECONOMIQUE DES BOVIDES AYANT REAGI A LA TUBERCULINE.

By J. B. Piot (Bey),
Cairo, Egypt.

Dans un but à la fois scientifique et économique, j'eus, en 1899, l'idée de m'enquérir de la proportion de bovidés tuberculeux qui pouvaient exister sur le bétail de l'Administration des Domaines de l'Etat égyptien. Et comme ce bétail était constitué, à ce moment, par environ 4000 bovidés adultes, répartis dans une soixantaine de fermes du Delta nilotique, la proportion trouvée sur le bétail domanial devait du même coup représenter assez exactement celle de l'Egypte entière. Tant au point de vue des conditions hygiéniques que de l'âge et de l'état du bétail, les fermes domaniales ne présentant que fort peu de différences, je choisis au hazard, pour ces essais, la ferme de Chendalat, province de Gharbieh, comprenant 47 bovidés, agés de 5 à 17 ans, de race ménoufi, tous utilisés aux divers travaux de la culture, et j'inoculai tous ces animaux, en 2 lots, les 21 et 24 septembre 1899, avec la tuberculine de l'Institût Pasteur de Paris.

Sur ce nombre de 47 boeufs, 39 présentèrent la réaction caractéristique; 8 restèrent insensibles à l'injection. C'est donc une énorme proportion de 83% de sujets tuberculeux, constatée sur un groupe d'animaux qui représente très sensiblement la moyenne du bétail égyptien.

Parmi les 8 individus qui n'ont pas réagi à la tuberculine, on compte *un* boeuf agé de 5 ans, 4 de 6 ans, 1 de 8 ans, 1 de 11 ans, et 1 de 13 ans. On voit ainsi qu'à partir de l'agé de 7 ans, les sujets non tuberculeux ne constituent plus qu'une très minime exception.

Donc, au double point de vue où je m'étais placé pour cet essai, les résultats ne manquent pas de présenter un très réel intérêt, et pour ma part, je les considère comme absolument incontestables, parce que j'ai constamment trouvé des lésions tuberculeuses sur les sujets morts ou abattus, plusieurs mois, plusieurs années après la réaction à la tuberculine. Ces résultats ne font d'ailleurs que confirmer la valeur diagnostique de la tuberculine, lorsque l'opérateur se place dans les conditions indiquées par Bang, Nocard, Arloing, et que le Dr. Calmette rappelait magistralement, hier encore, à la 3 *e* Section de ce Congrès.

Ayant pu suivre les 39 animaux qui avaient réagi à la tuberculine jusqu'à leur mort ou leur mise en réforme, j'ai cru devoir vous apporter ici le résultat de mes observations.

En dehors de l'intérêt scientifique qu'elles peuvent présenter et qu'atteste le Dr. Calmette, elles me paraissent offrir un intérêt économique qui a bien sa valeur, en Egypte tout au moins, car les bovidés y sont utilisés pour le travail jusqu'à complète incapacité, c'est à dire jusqu'à l'âge de 20 et même de 25 ans.

Les 39 boeufs décelés tuberculeux par la réaction à la tuberculine se répartissaient ainsi au point de vue de l'âge:

3 de	5 ans
4 de	6 ans
6 de	7 ans
4 de	8 ans
2 de	9 ans
3 de	11 ans
	12 ans
	13 ans
	14 ans
4 de	15 ans
1 de	16 ans
2 de	17 ans
et 1 de	18 ans

Sur ce nombre, il existe encore 9 animaux vivants et aptes au travail, dont 1 de 14 ans et 2 de 8, de 7, de 6 et de 5 ans, cet âge etant calculé au moment de l'inoculation à la tuberculine.

Sur les 30 autres animaux

1 boeuf de 18 ans a fait encore une année de service
1 de 17
4 de 15
1 de 14
1 de 12
1 de 11
1 de 8 ont travaillé également pendant toute une année.

1 de 16 ans a continué de travailler pendant 2 ans
1 de 14
2 de 15
1 de 12
1 de 11
2 de 9 ont travaillé pendant ce même temps.

1 boeuf de 17 ans peut travailler encore pendant 3 ans
1 de 13

1 de 12
1 de 11
et 2 de 7 peuvent travailler pendant 3 ans.

Un boeuf de 14 ans est resté en service pendant encore 5 ans

2 de 7 ans
2 de 6 ans sont resté en service pendant 5 ans.

Et enfin un boeuf de 18 ans a fourni encore 6 ans de service, ainsi qu'un boeuf de 9 ans.

Ces 30 animaux ont été successivement rayés de l'effectif, d'une part à l'époque de la réforme générale qui a lieu chaque année au mois de mai pour cause d'incapacité au travail due, soit à l'usure de l'organisme, soit à des tares physiques, soit à des maladies sporadiques, soit enfin à la tuberculose, et d'autre part, par la vente ou l'abatage au cours de l'année pour cause de tuberculose aiguë ou de tout autre accident rendant l'animal inutilisable.

J'ai pu assister à l'abatage d'une dizaine de ces animaux et m'assurer ainsi que tous présentaient des lésions plus ou moins étendues de tuberculose.

Il va sans dire que les sujets qui ont survécu une ou plusieurs années à l'injection de tuberculine, et, à fortiori ceux qui sont encore vivants à l'heure actuelle, ne présentaient pas de lésions ouvertes de tuberculose. J'ai pu m'assurer de ce fait à l'autopsie de quelques uns d'entre eux, abattus pour fractures ou pericardites traumatiques. Les lésions tuberculeuses se trouvaient localisées dans les ganglions rétro-pharyngiens, dans ceux de l'entrée de la poitrine, du mediastin ou du mésentère, ou dans le foie et le poumon sous la forme d'abcès plus ou moins volumineux, et généralement calcifiés. De l'exposé sommaire de cette expérience, laissez-moi tirer les conclusions suivantes:

En premier lieu j'y trouve la justification absolue de la méthode de mon excellent ami, M. le Professeur Bang, de Copenhague, dans la lutte préventive contre la tuberculose.

Si l'abatage immédiat des sujets tuberculeux à lésions ouvertes s'impose tant pour éviter un dépérissement et une dépréciation de l'animal au point de vue de la viande, que pour empêcher la contamination par les matières expectorées ou rejetées, il peut y avoir, et il y a certainement un avantage considérable à conserver dans l'isolement les animaux qui ont réagi, tant pour ceux destinés à l'engraissement que pour les animaux de travail.

En second lieu, la survie plus ou moins longue et assez souvent même considérable des sujets qui ont réagi a la tuberculine, permet de poursuivre sur ces animaux des expériences de curabilité de la tuberculose, soit par des injections successives du tuberculine, soit par tout autre moyen que la science ne tardera sans doute pas à decouvrir.

MEAT AND DAIRY HERD INSPECTION AS PREVENTIVE MEASURES AGAINST THE SPREAD OF TUBERCULOSIS AMONG CATTLE.

By Dr. Otto G. Noack,
Reading, Pa.

Measures for the protection of man against the infection of "animal tuberculosis are indispensable" was the conclusion reached by Damman and Muessemeier at the end of their research work on the relationship of human and bovine tuberculosis.

This statement is important, not because with it they assert the identity of the tubercle bacilli causing disease in the human and in the bovine race, in opposition to Koch's doctrine that tuberculosis of man and animal are two distinct diseases, not communicable from one to the other, but because it is the official acknowledgment of the prevailing theory of the uniformity of the tubercle bacilli, as this investigation was made at the instigation of the Royal Prussian Department of Agriculture. Besides Damman and Muessemeier, or rather prior to these investigators, Von Behring, Arloing, Preisz, DeJong, Salmon, and many others had proved the inaccuracy of Koch's assertion, and the International Veterinary Congress at Budapest, 1905, adopted the following resolution: "The suppression of bovine tuberculosis is absolutely necessary, not only in regard to economy, to lessen the damage caused by this scourge, but also to prevent the danger of transmission to man." The second report of the English Commission on Tuberculosis, 1907, reiterates likewise: "Man and beast can infect each other."

Since the uniformity of tuberculosis, therefore, is proved beyond a doubt, it remains for the proper authorities to take steps to introduce measures which will restrict, and possibly prevent, any infection of man from tuberculosis existing among animals. All such measures naturally will have a tendency to affect the transmission of disease from animal to animal, because every hygienic regulation is directed to this effect, to diminish and destroy the sources of contagion.

The most effective hygienic measures in this direction are meat and dairy herd inspection, which are practised for the benefit of man, but at the same time, if properly enforced, will restrict the spread of tuberculosis among cattle.

The slaughter-houses, especially where no control by local authorities has been exercised, have been centers of infection and distribution of diseases, especially tuberculosis, because it will happen to every butcher that, in the course of time, he may kill an animal more or less so afflicted. In many instances the tubercular material has been fed to hogs, and, as experience has proved, they contracted the disease; or rats, which are the constant inhabitants of such places, spread the disease through the neighborhood, in helping to dispose of the tubercular material, which they carried into the corn-cribs of the farmer and troughs of his cattle.

How bad the conditions in such slaughter-houses are may be easily recognized from a few cases, which I shall refer to and which were revealed by the State Meat Inspection Service of Pennsylvania. On the premises of a slaughter-house, in the northwestern part of the State, forty-eight hogs were kept, of which thirty-seven were so badly afflicted with tuberculosis that most of them were found to be unfit for human food. In another slaughter-house, in the central part of the State, six hogs were quarantined, of which two were killed showing tuberculosis, while the other four died of the disease during the following three months.

Furthermore, knives, other utensils, and floors never were disinfected or cleansed properly, and, therefore, became regular hot-beds for the growth of the bacilli of tuberculosis. Such conditions were changed immediately wherever a system of meat inspection has been introduced, because cleanliness and sanitary conditions and the proper disposal or destruction of offal, especially from diseased animals, were the first things to be looked after; although in the United States we hardly can speak of a complete or perfect system of meat inspection, with the exception of the Federal Meat Inspection Service, as far as it relates to interstate trade, and the municipal meat inspection at Nashville, Tennessee. Here I shall not forget to mention the newly instituted meat inspection system of the State of Pennsylvania—the only system at this time in this country, very defective yet, but far-reaching in its results under the direction of the secretary of the State Live-stock Sanitary Board. With pride, as a citizen of this commonwealth, I may say that 90 per cent. of the slaughter-houses within the borders of this State, no matter whether located on a mountain-ridge or in a remote corner of some valley, can favorably be compared at this time and compete with any small slaughter-house of any State or nation as to cleanliness and sanitation.

Compelling the butchers to keep their places in sanitary condition, therefore, means the destruction of many sources of tubercular infection. Meat inspection can be made very effective and great results may be obtained, not only by keeping killing establishments clean and sanitary, but by tracing the animal to the place from where it was shipped, whenever a carcass

is found to be afflicted with tuberculosis. In this way we shall be enabled to discover the location, and probably the source of infection for the place in question.

If the commission man or farmer could be educated or compelled to mark his animals with a number or sign, burned on the shoulder or hip of the animal before it leaves the farm, tracing of animals would be comparatively easy.

The recommendation of the Bureau of Animal Industry as to numbered tags I do not think advisable, because the tags are torn from the ear very easily, and many of the animals would lose them before reaching the point of destination. In those cases it would be impossible to identify the animal.

Until we arrive at this point, a great deal of educational work among the farmers will have to be done. It will be a matter for the State authorities to take up, sending bulletins with such information to the farmers throughout the country, that they may more readily comprehend the situation, and realize that their assistance in the eradication of tuberculosis is for their own personal benefit.

If a system of this kind is established, it will be an easy matter to get at the root of the evil. I shall show from the following example what may be done in this direction: At a sanatorium it was found that the organs and viscera of most of the hogs killed appeared to be in such an abnormal condition that even the men who did the killing thought the hogs were afflicted with some disease, which upon bacteriological examination was recognized as tuberculosis. After close inquiry as to feeding, the cause was traced to the skimmed milk, which was given daily in a raw state as food to the hogs. On account of the prevalence of tuberculosis on the premises the herd of sixty-five head, consisting mostly of Holsteins, was tested with tuberculin, and fifty-six were found to be tubercular—forty-seven on the first, nine on the second test. They were slaughtered and disposed of according to the rules of the meat inspection service. Afterward only tested animals were purchased and added to the herd, and as a precaution milk was pasteurized and then fed to the hogs. Since, no cases of tuberculosis in hogs have been discovered at this place.

In Pennsylvania the State Live-stock Sanitary Board has practically a system of locating farms infested with tuberculosis. In 1903 the legislature passed an act, known as the "Butcher's Indemnity Act," to encourage the repression of tuberculosis of cattle, and to provide for the disposition of the carcasses of meat-producing animals that are affected with tuberculosis to a degree that renders their flesh unfit for use as food.

Whenever the butcher or farmer claims indemnity for a diseased carcass, he has to prove, after a proper autopsy by a veterinarian, and by affidavits of the previous owner or owners, that the animal has been for four months

prior to slaughtering in the State of Pennsylvania. By so doing the State Live-stock Sanitary Board receives knowledge where the tubercular animal had been, and even where it was raised. In some cases an examination of such herds is made to learn to what extent tuberculosis is prevailing, especially if a dairy farm is involved. Advantage to the fullest extent is not taken of this law at the present time, on account of incurring popular disfavor, but as the education of the people on this subject progresses and the value of such examinations is understood, the law will be more strictly enforced. For example, I shall show, from the farmer's attitude toward the tuberculin test, what education does. Ten years ago bitter opposition was made against the examination of cattle with tuberculin, and the applications made for such tests at State expense were few; they number now nearly one thousand annually, besides the private tests which are made continually and aggregate more than one hundred. One setback is given this work, due to the small appropriations by the legislature, which are always exhausted long before the next may be used.

Since Chauveau has proved that tubercular germs contained in food cause tubercular lesions in the intestinal tract, meat inspection ought to be made thorough in order to eradicate tuberculosis among cattle, because it is one of the most efficient means to obtain the desired results.

Through meat inspection we are led to the dairy farm—the source of spreading tubercular infection. Meat is the food of the adult; but of the young and newly born mammals it is milk, and nothing else can replace it. From a hygienic point of view it is necessary to demand that the milk come from healthy cows, is handled in a cleanly manner, and is properly cared for.

The dairy herd inspection, accordingly, will have for its object the proper lighting, ventilation, and sanitation of stables, the different methods of diagnosing tuberculosis, and the methods of protection against the acquisition of the disease.

No matter in what condition the stable is, so long as there is no disease existing in the stable, no danger of tuberculosis will arise for man or beast; but the aspect changes entirely if the dreaded disease is present. Danger lurks everywhere, and even the most careful disinfection is not able to destroy the germs and stop the progress of disease if the stable and surroundings are in an unclean and unsanitary condition, besides being poorly lighted and ventilated.

Light and ventilation alone will to a great extent check the spread of tuberculosis among animals, by increasing vitality and power of resistance. In the erection of stables we certainly should not follow the advice of Reynolds (Minnesota), who thinks the value of ventilation is overestimated; "that when animals confined in unventilated stables are injuriously affected, it is so because of lack of exercise, lack of sunshine, and a concentration of

pathogenic microörganisms." The last assertion upsets his theory, because in stables with good ventilation there cannot be a concentration of microörganisms and tuberculosis cannot spread as rapidly.

Klimmer states that after introduction of good ventilation in stables the morbidity and mortality among animals decreases, while their productiveness increases. To this effect Damman reports that eighty well-fed Swiss cows in a stable, at Frankfort-on-the-Main, after installation of a good system of ventilation, on the same ration and quality of food averaged 483 quarts of milk more annually than before the installation.

That the stables will need plenty of light, although the cattle should be protected against the hot rays of the sun during the middle of the summer days, can easily be observed, for, according to Koch, the sunlight kills the tubercle bacilli in a few minutes, and the divergent daylight has the same effect, only the destruction occurs more slowly.

The floor ought to be so constructed that the gutters drain rapidly, and consist of material which can be easily cleansed and disinfected, because here we find the greatest danger.

Through their experiments Schroeder and Mohler, and Schroeder and Cotton were convinced that there is no other source from which the tubercle bacilli may be spread to a greater extent than from the milk mixed with the particles of fresh excrement of tubercular cows proved by tuberculin to be afflicted, but Reynolds could find the results only in the feces of one reacting milch-cow. These investigators contaminated fresh milk from healthy cows with feces coming from reacting cattle. Some of this milk was strained and injected; the rest was used hypodermically in its natural state. In both cases they were able to produce tuberculosis in guinea-pigs.

Is not this argument convincing enough that the stables should be properly disinfected every day, the cows and their udders thoroughly cleansed before milking, and the persons attending to the milking be healthy and should be careful not to contaminate their hands with fecal matter? The utmost cleanliness must be exercised during the act of milking, because the results caused by neglecting these rules may be more disastrous than commonly realized. The international Congress of Dairymen, held in Paris, October 16, 1905, in one of the resolutions adopted, recommends to institute a control over dairy farms similar to that exercised over meat markets.

The only precaution we have against this way of infection is pasteurization or sterilization of milk. As long as we have no knowledge of the condition of a stable as to sanitation and the existence of tuberculosis therein, it is the safest to use one or the other method as protection against acquiring the disease.

This mode of infection, by way of manure carried into the milk, is not to be underestimated, either for infants or for calves. But without a doubt

the greatest danger arises from the cow afflicted with tuberculosis of the udder, or with generalization of the disease, where germs are passed more or less with the milk. Nothing is done by most of the farmers in this direction to prevent the calves from contracting the disease from the dam until their attention is awakened when it is too late.

The farmer who operates a dairy farm and raises cattle for breeding purposes should be compelled by law to have his cattle undergo a physical examination at least twice a year, or once by the tuberculin test. Upon a thorough physical examination we will find only affected animals showing clinical symptoms, while with the aid of the tuberculin test most all of the diseased animals are discovered by the appearing reaction.

All animals with clinical symptoms should be removed as quickly as possible and destroyed, because their presence is a standing menace to the healthy ones. Those which respond to the tuberculin, showing a clear reaction, should be disposed of according to one or the other method in vogue. I shall mention here the Bang system, which is the most economical, and too well known to go into details, although not popular on the American continent; the Ostertag method, which only relies on the physical examination of animals, while it contends that the danger of animals which react to the tuberculin is very slight, as proved by Nocard, Bang, Schroeder and others, and by his own experiments, notwithstanding Rabinowitsch's and Mohler's findings to the contrary.

None of these scientists could find tubercle bacilli in the milk of such cows, or produce tuberculosis in guinea-pigs by injecting the same subcutaneously. The same results are reported by Kinnell, Massachusetts, from practical observation made on the herds of Sloane and Colt, 1894, published in his article, "Sanitation versus Tuberculin in the Eradication of Tuberculosis."* He noticed that none of the heifers which had been born and reared by reacting dams responded to the tuberculin. He ascribed this phenomenon to the rule at the Sloane farm, that young animals after weaning were kept separated in the stable from the part which was occupied by the cows. He had the same experience with calves on the Colt farm, where even the sanitary conditions were very bad.

Undoubtedly these contentions are correct. But there is one drawback to these methods—keeping the source of infection constantly on the premises. Where the infection is in reaching distance, it is hardly possible to keep the disease from the healthy animals. On the other hand, a compulsory tuberculin test, as it was practised in Massachusetts and Belgium, was soon shown to be too radical and expensive, and, therefore, not advisable.

In Pennsylvania, Pearson, the secretary of the State Live-stock Sanitary Board, advised the following measures, which were adopted: Wherever an

* Journal Comp. Med., 1898, No. 6.

owner desires to free his herd from tuberculosis and has the same tested at his own expense, he may ask for the aid of the State to dispose of the afflicted cattle, according to the rules and regulations of the meat hygiene service. Otherwise, where a demand is made for an immediate examination or a complaint is entered, a physical examination is made. If conditions of such herds and premises are very bad, a compulsory tuberculin test with thorough cleaning is ordered. The reacting cattle are quarantined and the owner notified to boil or pasteurize the milk before using.

The tuberculin test is mandatory in all cases where cattle are imported into Pennsylvania from any other State or country, by legislation approved May 26, 1897; an act to protect the health of domestic animals of the commonwealth of Pennsylvania and the regulations in conformity with this act governing the driving or shipping of dairy cows and neat cattle for breeding purposes into Pennsylvania on and after January 1, 1908.

If any of the shipped cattle react, they must be killed under the supervision of a veterinarian and disposed of according to the rules of the State meat hygiene service, because the dealer is prevented from reshipping the tubercular animals on account of an order recently issued by the secretary of the United States Department of Agriculture, prohibiting the shipping of tubercular cattle from one State into another.

Without a doubt tuberculin is the principal and only aid which will enable us to eradicate tuberculosis. We have already some herds in the State of Pennsylvania where this scourge is eliminated. To keep it out of the herd takes as much care and attention as it does to free the herd from this disease.

I shall give an instance where by the slightest neglect tuberculosis was reintroduced into a herd: at State College the dairy herd was found to be free from tuberculosis, no animal reacting, while four calves, ranging in age between three and six months, were found to be tubercular. Upon investigation it was apparent that the skimmed milk was the cause of the trouble. The milk of untested milch-cows was brought by the neighboring farmers to the creamery and mixed with their own in the separator. The skimmed milk afterward was warmed in tepid water and fed to the calves. Could any better condition be created for the growth of the bacilli? It was only astonishing that not many more were infected.

Thus we can see that tuberculin is the only medium by which we may eliminate tuberculosis from cattle, and is also recognized, even by laymen, as the only safe agent to detect and determine the condition as to the prevalence of disease in a dairy herd, which is evident from the resolutions passed by the International Congress of Dairymen, October, 1905, at Paris.

All cows intended for the production of milk for consumption should be provided with a certificate of health by a veterinarian, and each milk establishment should be the object of frequent sanitary visits.

Each tubercular milch-cow, even without any noticeable clinical symptoms, giving simply a clear and positive reaction to the tuberculin, should be eliminated from the milk industry, or milk coming from such milch-cows should only be consumed after having been previously heated long enough and at a temperature sufficiently high to render the tubercle bacilli inoffensive.

The milk should only be consumed in the raw state if the cows did not react to the tuberculin when the tuberculinization was made under the control of a competent man. All commercial by-products from milk coming from tubercular animals should be sterilized before they are given to the trade.*

Finally, one may consider under preventive measures, against the acquisition of tuberculosis, immunization. For this purpose vaccines are prepared from human tubercle bacilli, which, after being raised in cultures for many generations, have lost more or less of their virulence and are then injected into the jugular vein of young calves. At present two methods are still in use—von Behring's and Pearson's. What importance these modes of protection may have is still a matter of speculation; although I am satisfied that Pearson has better results than von Behring, because Pearson demands the removal of tubercular animals from the herd before vaccination and reduces the danger of infection to a minimum.

I think the best results will be obtained in the cheapest and easiest way by the farmer if he can be convinced and induced to boil the milk he feeds to the calves, and keep them separated from the other cattle.

In conclusion, I recapitulate that the transmission of tuberculosis from animal to animal may be prevented:

(A) By meat inspection:

1. By the proper destruction of tubercular material from diseased carcasses.
2. By cleanliness and sanitary conditions of slaughter-houses.
3. By the discovery of the sources of infection.

(B) By dairy herd inspection

1. Through proper ventilation, lighting, and disinfection of stables, which will materially aid in the destruction of tubercular germs; especially since, according to Schroeder and Mohler and Schroeder and Cotton, manure from tubercular cattle, even if they are only reacting to the tuberculin, contains more or less tubercle bacilli.
2. Examination of each animal should be made physically at least twice, or by tuberculin once during the year. The tubercular animals should be destroyed, for only in this way can the source of infection be removed.

* Revue Vetérinarire, 1905, p. 863.

Die Inspektion von Fleisch und Viehherden als Verhütungsmassregel gegen die Verbreitung der Tuberkulose unter dem Rindvieh.—(NOACK.)

Die Einheitlichkeit des Tuberkelbazillus ist heute überall anerkannt, und selbst wenn die preussische Regierung Koch's Theorie verwirft, lässt sie Forschungen über die Untersuchungsarbeiten von Damman und Müssemeier machen und nimmt an was jene gefunden haben. Auch die englische Kommission kommt im Jahre 1907 öfters darauf zurück: "Mensch und Tier können einander infizieren."

Alle Massnahmen, um den Menschen gegen die Übertragung der Tuberkulose von Tieren zu schützen, streben zur selben Zeit danach, die Ausbreitung vom Tier zu verhindern. Die hauptsächlichen Faktoren in dieser Richtung sind die Inspektionen des Fleisches und des Herdenviehs.

1. Fleischinspektion verursacht die richtige Vernichtung tuberkulösen Materials.

2. Die Regeln und Vorschriften eines solchen Dienstes und die Aufsicht über die Schlachthäuser erzwingen Reinlichkeit dieser Plätze, welche andernfalls Treibhäuser der Tuberkelbazillen wären.

3. Durch die Inspektion kann ein System zur Entdeckung der Quellen der Tuberkulose geschaffen werden. Pennsylvanien hat ein System dieser Art durch den "Butchers' Indemnity Act von 1903" ins Leben gerufen.

Das System führt uns zur Inspektion der Viehherden, welche ungefähr das Folgende bringt:

Erstens: Richtige Ventilation, Beleuchtung und Desinfection von Ställen, Massregeln, welche hauptsächlich in der Zerstörung tuberkulöser Keime mithelfen werden, und die absolut notwendig sind, seitdem Schroeder und Mohler und Schroeder und Cotton bewiesen, dass tuberkulöse Rinder, selbst wenn sie nur auf Tuberkulin reagieren, mehr oder weniger den Tuberkelbazillus in sich tragen.

Zweitens: Untersuchung eines jeden Tieres entweder physikalisch, was zum mindesten zweimal jährlich geschehen sollte, oder durch Tuberkulin. Das Schlachten der Befallenen bedeutet die Eliminirung einer ständigen Gefahr.

Pennsylvanien hat in dieser Richtung die besten Massnahmen, um erkranktes Vieh bei Seite zu schaffen.

Inspection des Bêtes de Baucherie et des Vaches laitières pour empêcher la Propagation de la Tuberculose chez le Bètail.—(NOACK.)

L'uniformité du bacille tuberculeux est aujourd'hui admise par tout le monde: le gouvernement prussien lui-même a réfuté la théorie de Koch en ordonnant les recherches de Damman et de Muessemeier et en acceptant

les résultats obtenus. La Commission anglaise, elle aussi, déclara en 1907: l'homme et la bête peuvent s'infecter réciproquement.

Toutes les mesures prises pour empêcher la contagion tuberculeuse de l'homme par l'animal ont aussi pour effet de diminuer les chances de contagion de l'animal par l'animal. Les principales sont l'inspection de la viande et l'inspection des vaches laitières.

1. L'inspection de la viande fait détruire comme il le faut des matières tuberculeuses.

2. Les arrêtés et les réglements du service d'inspection et la surveillance des abattoirs rendent la propreté et la sanitation obligatoires en des lieux qui, autrement, seraient des foyers de culture pour les bacilles tuberculeux.

3. L'inspection permet d'établir un système pour découvrir les sources de tuberculose. La Pensylvanie a un système de ce genre créé par la loi d'indemnité des bouchers (Butchers' Indemnity Act, 1903).

Ce système nous amène à l'inspection des vaches laitières, qui produit les rèsultats suivants:

1. La ventilation, l'éclairage et la désinfection convenables des étables, mesures qui aident beaucoup à détruire les germes tuberculeux. Ces mesures nécessaires, puisque Schroeder et Mohler et Schroeder et Cotton ont prouvé que le bétail tuberculeux, même le bétail qui ne fait que réagi à la tuberculine, contient plus ou moins le germe de la tuberculose.

2. L'examen de chaque animal, soit physique (lequel devrait se faire au moins deux fois par an), soit à la tuberculine. L'abattage des animaux affectés, c'est l'élimination d'un danger constant. L'État de Pensylvanie emploie les meilleurs moyens de disposer des animaux affectés.

VACCINATION GEGEN TUBERKULOSE BEIM RINDE.

Von Prof. J. F. Heymans,
Ghent, Belgien.

Es geschieht auf Veranlassung meines Freundes und Spezialkollegen, Hofrat Meyer, dass ich heute die Ehre habe, das Katheder Ihrer Gesellschaft zu besteigen, um Ihnen über Tuberkuloseimpfung zu berichten.

Die Impfungsverfahren von v. Behring, Koch, und Schutz, v. Baumgarten, Lignieres, Friedmann, Calmette, Vallee, Arloing u. a. sind Ihnen bekannt; ich kann also direkt zur Beschreibung meiner Methode, wozu jetzt schon ein bestimmter Mut gehört, übergehen, ohne dabei Kritik- oder Ueberlegenheitsfragen aufwirbeln zu wollen; das Richtige darüber werden mit der Zeit nüchternes Denken und die Erfahrungen von selbst herausschalen.

Wer von Impfung gegen Tuberkulose spricht, muss selbstredend die Möglichkeit einer erworbenen Immunität, eventuell Heilung bei Menschen und Tieren heilt, bzw. nicht immer tödlich wirkt, bestreitet wohl niemand; dass die "Superinfektion" bei weitem nicht dieselbe Tuberkelbildung hervorruft wie die Grundinfektion, kann täglich experimentell bewiesen werden. Dass ein gesundes, in einen verseuchten Stall gebrachtes Rindvieh, einmal infiziert, in demselben jahrelang derselben Infektion ausgesetzt, bei der Sektion nur die abgekapselten und verkalkten Tuberkelläsionen der ersten Infektion oder gar keine Läsionen zeigt, habe ich, wie andere, schon oft beobachtet; beim gesunden Rinde, resp. Menschen, genügen wenige, in den Respirations- oder Digestionsapparat gebrachte Bazillen, um die Entstehung von Tuberkeln hervorzurufen; dagegen kann eine mit offener Tuberkulose behaftete Lunge tagein, tagaus massenhaft Bazillen eliminieren, ohne dass neue Tuberkeln im gesunden Teile der Lunge, im Kehlkopfe, im Darmtraktus u. s. w. entstehen. Diese und viele andere Gründe beweisen unstreitbar, dass der unter dem Einflusse von Tuberkeln stehende Organismus gegen eine neue Tuberkelbildung deutlich widerstandsfähiger ist, dass also eine erhöhte Resistenz oder Immunität gegen eine neue Bazilleninfektion besteht und dass diese Reaktion des Organismus zur vollkommenen Abkapselung und Heilung der stattgehabten Infektion führen kann und führt.

Das Problem der Impfung gegen Tuberkulose, wie dasselbe für die Blattern schon gelöst ist, müsste also durch die Herstellung eines impfenden

Tuberkels, mit all den Vorteilen, aber ohne die Nachteile des spontanen Tuberkels, gelöst und dieses Problem wird gelöst sein, wenn wir den zu impfenden Organismus und den impfenden Tuberkelbazillus in solche Wechselwirkung bringen, dass keine progressive Tuberkuloseinfektion auftritt.

Um diesen reziproken Zustand herzustellen, haben wir folgendes Verfahren eingeschlagen. Wir füllen etwa 1 mg. lebender, mit Pulver verdünnter Bazillen—welche Qualität und Quantität von Bazillen die besseren Resultate geben, ist noch nicht entschieden—in ein Schilfrohrsäckchen, das zugebunden und der Sicherheit wegen darauf kollodioniert wird und dieses bazillenhältige Säckchen wird unter die Haut des Rindes gebracht. Statt längerer Beschreibung demonstriere ich Ihnen gleich die fertigen Säckchen, die zur Operation nötigen Instrumente, sowie das sehr einfache Operationsverfahren selbst.

Dass das unter die Haut gebrachte Säckchen vaccinierend wirken kann und wirkt, geht aus folgenden Daten hervor: Ich bringe 0.5 cm.^{3} Rohtuberkulin in ein Säckchen und lasse sie 24 Stunden gegen 5.0 cm.^{3} physiologischer Kochsalzlösung diffundieren, spritze dann diese 5.0 cm.^{3} einem tuberkulösen Rinde ein; letzteres reagiert typisch. Tuberkulin diffundiert also durch die intakte Membran des Säckchens, wie Sie aus der Farbe des herumgereichten Rohres schon erschliessen können.

In ein 0.5 cm.^{3} Glyzerinbouillon enthaltendes Säckchen impfe ich Tuberkelbazillen über und bringe dann das Säckchen in einen, 50 cm.^{3} Glyzerinbouillon enthaltenden Kolben; die Bazillen entwickeln sich im Brutofen allmählich zu einer kompakten, zylindrischen Säule, welche bis unten und bis oben das Lumen des Säckchens erfüllt, wie die drei hier mitgebrachten Kolben deutlich zeigen. Es lässt sich nun zeigen, dass die Bouillon, in welcher das Säckchen hängt, dieselben spezifischen Eigenschaften besitzt, wie diejenige, auf deren Oberfläche sich eine dicke Haut von Tuberkelbazillen frei entwickelt, d. h. sie ist tuberkulinhältig und die Bazillen vermehren sich, als ob sie die ganze Bouillon des Kolbens zur Ernährung und Sekretion frei zur Verfügung hätten.

Wie in vitro und im Brutofen, verhält sich das unter die Haut des Rindes gebrachte Säckchen. Ein tuberkulöses Rind reagiert typisch, wenn man unter die Haut ein 0.5 cm.^{3} Rohtuberkulin enthaltendes Säckchen bringt. Anderseits, wenn ein Bazillen enthaltendes Säckchen unter die Haut gelegt wird, gedeihen die in ihm befindlichen Bazillen, wie mikroskopische Schnitte dieses Säckchens zeigen, und zwar so lange, als sie per Diffusion die nötigen Nährstoffe erhalten. Wie Infektionen bei Meerschweinchen zeigen, bleiben die Bazillen am Leben und sezernieren im Organismus des geimpften Tieres ihre spezifischen Stoffe, so lange die herein diffundierten Substanzen nicht völlig bakterizid gewirkt haben, d. h. so lange keine genügende Immunität des Organismus besteht.

Rund um ein unter die Haut gebrachtes Säckchen bildet sich schon in den ersten 48 Stunden ein fast nur aus polynukleären Zellen zusammengesetztes Exsudat, um das sich innerhalb vier bis acht Tagen eine derbe Bindegewebskapsel entwickelt. Im Zentrum befindet sich das intakte Säckchen, welches keine Zellen enthält, wohl aber Bazillen, die ausserhalb des Säckchens mikroskopisch nicht zu finden sind. Der kleine Impfknoten gleicht alsdann vollkommen einem Tuberkel, mit Ausnahme der totalen Trennung und Isolierung der Bazillen. Nach sechs bis acht Monaten verkalkt und zu gleicher Zeit atrophiert der Impfknoten in toto, die Bazillen zerfallen, degenerieren und sterben ab, so dass der ganze Inhalt eines Impftuberkels nach 12 bis 18 Monaten, einem Meerschweinchen eingespritzt, keine Tuberkulose hervorruft.

Dass ein hermetisch verschlossenes Säckchen als Diffusionsmembran für die spezifischen Bazillenprodukte wirkt und anderseits das Heraustreten der in ihm enthaltenen Bazillen verhindert, unter anderem, dass das Säckchen nicht platzt, ist leicht zu demonstrieren. Bei Rindern, welche eine bis vier Wochen nach der Impfung geschlachtet werden, kann man das Säckchen aus dem Impfknoten absolut intakt herausholen, wie die vier hier mitgebrachten Exemplare beweisen und die Emulsion der das Säckchen umgebenden Schicht infiziert Meerschweinchen nicht. Das weitere Schicksal des Säckchens als Dialysator hängt im allgemeinen von der Qualität und Quantität der Bazillen, besonders von dem Digestions- und Immunisierungsvermögen des geimpften Organismus ab; über die Einzelheiten dieser Vorgänge bin ich noch nicht genügend orientiert.

Wie das eingeimpfte und in einem Kolben aufgehängte Säckchen die umgebende Bouillon mit spezifischen Bazillenprodukten bereichert, so imprägnieren auch die in ihm enthaltenen Bazillen den Körper des geimpften Tieres mit denselben spezifischen Stoffen: ein nicht tuberkulöses Rind reagiert nämlich drei bis sechs Wochen nach der Impfung charakteristisch auf Tuberkulin—wie Moussu auf ähnliche Weise mit Tonerdefilter beobachtet hat—ganz wie ein tuberkulöses Tier, u. zw. deshalb, weil die Allgemeinwirkung des Impftuberkels dieselbe ist wie die des Infektionstuberkels.

Diese Tuberkulen-Überempfindlichkeit verschwindet durchschnittlich sechs bis acht Monate nach der Impfung, so dass gesund geimpfte Rinder, welche acht bis zwölf Monate später auf Tuberkulin nicht reagieren, als tuberkulosefrei betrachtet werden können.

Was bei dem Auftreten, Bestehen und Verschwinden der Tuberkulin-Überempfindlichkeit, resp. bei der Immunisierung des geimpften Tieres sich im Organismus ändert, ist eine Frage, deren Lösung die Erkenntnis des Mechanismus der Impfung fordern wird, welche uns aber erst interessieren wird, wenn wir über das Bestehen einer antituberkulosen Vaccination einig sind.

Ist also ein säckchentragendes Rind gegen eine experimentelle, bzw. gegen eine spontane Infektion geimpft? Wenn wir oben eine bestimmte Immunität und Heilung bei der spontanen Tuberkulose als bewiesen annehmen, so brauchen wir hier wohl kaum hinzuzufügen, dass dieselbe, was Intensität und Dauer betrifft, nur eine relative ist. Dass die mittels der Säckchenmethode geimpften Rinder weniger schnell und weniger hochgradig subkutan oder per os infizierbar als die Kontrolltiere, geht aus drei Versuchsreihen von insgesamt 36 Rindern hervor. Kurz zusammengefasst, sind die Hauptresultate folgende: Kontrolltiere erliegen der Infektion, geimpfte nicht; letztere reagieren später auf Tuberkulin und zeigen bei der Schlachtung weniger ausgedehnte Läsionen als erstere.

Dass diese der experimentellen Infektion gegenüber erhöhte Resistenz der geimpften Tiere genügt, um dieselbe gegen die natürliche Infektion greifbar zu schützen, beweisen die Beobachtungen von verschiedenen, in der Praxis daraufhin angestellten Versuchsreihen: Zehn nicht reagierende Rinder, davon fünf geimpfte, werden direkt in einen verseuchten Stall gebracht; fünf Monate später geschlachtet, sind von den fünf geimpften eines tuberkulös, vier nicht; von den fünf nicht geimpften sind vier tuberkulös, eines nicht. Von 18 anderen gesunden Rindern, davon neun geimpft, wurden unter den Kontrolltieren sechs tuberkulös, drei nicht und von den neun geimpften zwei tuberkulös, eines zweifelhaft und sechs nicht tuberkulös bei der Schlachtung gefunden.

Von den über 4000 gesunden, in den Jahren 1905, 1906 und 1907 geimpften Rindern haben die Retuberkulinisationen ergeben, dass die Mehrzahl derselben (ca. 80%) nicht reagierten, dass sie also tuberkulosefrei geblieben sind, wenn wir uns auf die Tuberkulinreaktion bei geimpften Tieren verlassen können. Die genaue Obduktion dieser Tiere allein kann darüber entscheiden; unter den ca. 500 bis jetzt obduzierten Rindern sind etwa 150 gesund geimpfte Tiere, welche bei der Retuberkulinisation nicht reagierten; tuberkulöse Läsionen wurden bei etwa sechs Stück gefunden. Wenn also die Tuberkulineinspritzung nur etwa ein Jahr nach der Impfung gemacht wird, ist dieselbe für die Diagnose ebenso beweisend bei geimpften wie bei nicht geimpften Rindern.

Aus den Ergebnissen dieser zahlreichen Versuche und Beobachtungen glaube ich schliessen zu können, dass die mittels der Säckchenmethode geimpften Tiere bedeutend resistenter sind gegen die künstliche, sowie die spontane Infektion.

In der Praxis würden in allen Viehbeständen nicht nur die nicht reagierenden, sondern auch die schon reagierenden Rinder geimpft; da bei den letzteren wie bei den ersteren die im Säckchen eingeschlossenen Bazillen ebenfalls langsam, aber kontinuierlich Tuberkulinstoffe im tuberkulösen Organismus hereindiffundieren lassen, ohne je die geringste allgemeine Reaktion hervor-

zurufen, so stellt die Säckchenmethode wohl die idealste Einspritzungsmethode von Tuberkulin als kurativ Mittel bei der Tuberkulose dar. Bei der Bekämpfung der Rindertuberkulose ist die eventuelle Heilung oder Besserung tuberkulöser Tiere selbst Nebensache, aber sie vermindert die Infektiosität unter dem Viehbestande. Soviel kann ich bis jetzt behaupten, dass die geimpften tuberkulösen Rinder in grösserer Zahl als die nicht geimpften aufhören, auf Tuberkulin zu reagieren und dass sie bei der Obduktion bedeutende regressive Läsionen zeigen.

Wie die schon publizierten Resultate ergeben haben kann man mit der Impfung allein die Infektion der gesunden Rinder in den verseuchten Viehbeständen eindämmen; zu einer rationellen und praktischen Bekämpfung der Verseuchung muss man selbstredend so weit wie möglich alle prophylaktischen Massregeln, wie Isolierung, Schlachten der Tiere mit offener Tuberkulose, Sterilisieren der Milch u. s. w. mitwirken lassen.

Zur Eruierung der Dauer der Immunität sind in einer Reihe von Viehbeständen die Impfungen etwa halbjährlich wiederholt worden, in den meisten aber nur jährlich, wobei jedesmal die neu hinzugekommenen Tiere erst geimpft wurden: Versuche über je zweijährige Impfung oder länger sind noch nicht abgeschlossen; soviel scheint festzustehen, dass eine jährliche Impfung des Viehbestandes mehr wie genügt.

THE VACCINATION OF CATTLE AGAINST TUBERCULOSIS.

ABSTRACT OF PAPER BY LEONARD PEARSON, V.M.D.,
State Veterinarian, Philadelphia, Pa.

It is now established that the resistance of cattle to infection by the tubercle bacillus may be increased by vaccination with living tubercle bacilli of the types that produce natural infection in mammals. It is necessary that the culture used for vaccinating shall be of such low virulence as to be non-pathogenic for the species of animal upon which it is used. It does not seem to be proved that tubercle bacilli from birds will produce immunity in mammals, nor has it been possible to produce a material or serviceable degree of immunity by the use of dead tubercle bacilli or extracts.

The best results, thus far, have come from the use upon cattle of cultures of human origin and type. The vitality of the vaccine is important. Any drying or grinding process that kills a part of the tubercle bacilli, or weakens them, lessens the efficiency of the vaccine.

The degree of immunity is proportional, in large measure, to the extent of vaccination—*i. e.*, to the number of times vaccinated, the dosage, and the period of time recovered. The duration of resistance is from one to three years.

Vaccine may be administered subcutaneously or intravenously. To give to cattle by the mouth cultures of tubercle bacilli that are virulent for man, or for any domestic animal, as swine, is not to be recommended in practice.

The method of administering a vaccine in a capsule inserted beneath the skin, as proposed by Heymans and extensively used by him in Belgium, appears to be promising, and should be tried in comparison with other methods.

To restore immunity after it has disappeared, in milking cows, one should not use a vaccine that is virulent for man, unless it shall be established, beyond doubt, that there is no possibility that any of the bacilli so introduced are excreted through the udder. But it appears that an avirulent culture may be used for this purpose. Klimmer's work with such a culture is most valuable.

A disadvantage of vaccination by the intravenous method is that it is followed by a short negative phase or period during which resistance to

infection is diminished. Hence, it is necessary that cattle so vaccinated shall be carefully protected from exposure during the whole period that they are undergoing vaccination, and for at least six weeks thereafter. Another disadvantage is that for as much as six months after vaccination, and sometimes longer, there is a hypersensitiveness to tuberculin, so that one is not in position, by the use of the tuberculin test, to determine whether the animal is or is not infected with tuberculosis.

By the combined use of a modification of the Bang system and vaccination, it should be possible to control tuberculosis in herds where the Bang system in its entirety is not practicable.

DISCUSSION.

PROF. HEYMANS: My method of immunization against tuberculosis is based upon the production of an artificial tubercle, but this tubercle has not the power of infection.

A fundamental experiment to prove the value of my vaccination is by taking a flask, filling the same to a certain height with a glycerin bouillon medium, and then placing in the same a sac of living tubercle bacilli. After a certain time it will be found that the bacilli will grow and produce colonies in the sacs, while the bouillon will contain the toxins of the tubercle bacilli—the tuberculin.

This can also be proved by inoculations into animals, which will show a reaction to the tuberculin test if they should be affected with tuberculosis. These experiments can be repeated every day, and will demonstrate clearly the method of immunization carried out by me.

In practice the same method may be applied by introducing into the animal a sac with raw tuberculin; such an animal will soon react to the tuberculin test, showing that the tuberculin transfuses into the organism. On the other hand, if I introduce tubercle bacilli into the sac, and the sac into the body, they draw through the membrane of the sac from the body the substance required for their sustenance. The bacilli remain in the sacs, but their toxins pass outside and saturate the body without producing an infection. The sacs may be taken out, and it will be seen that they contain the living organisms and are otherwise intact. If such a sac is removed from the body, it is found that two days after its introduction it is covered with an exudate which forms around the sac. In eight days the sac becomes almost entirely encapsulated by connective tissue; thereby an artificial tubercle is produced, from which no bacilli can escape. Yet by dialysis the toxins leave constantly from the sac, thus saturating the organism, while in the natural tubercle the bacilli can and do, of course, leave the tubercle together with the toxins.

The numerous experiments which I have carried out on animals proved the practicability of this method.

In the experiments, the animals which were vaccinated showed resistance, while of the control animals not a single one escaped the disease.

The lesions in the vaccinated animal are always confined to small areas. They are calcified and show a retrogressive form of the disease. The vaccination is performed in the following manner:

A stable is entered, and all animals in the herd are tuberculin-tested. After the tuberculin test all the animals of the herd are vaccinated. There are numerous places where we have employed this method for the last four years, the tuberculinization with the vaccination, and it has given entirely satisfactory results. At 6 o'clock in the evening the animals are tuberculinized and temperatures are taken. Next morning at 6, 9, and 12 the temperatures are taken, and between 9 and 12 the vaccination is accomplished; no time is therefore wasted.

In an infected stable 10 animals were taken which were vaccinated, and 10 control animals were used. Of these controls, 8 developed tuberculosis, while only 2 of the vaccinated animals became infected. This goes to show that if a vaccinated animal is brought into an infected stable it will have more resistance against the disease; and if the disease is contracted, it will not be as severe as under ordinary circumstances.

In Belgium up to this date one thousand herds have been vaccinated, with about 40,000 animals. All animals are vaccinated, whether tuberculous, pregnant, or those which have just given birth. There are absolutely no ill effects noticed from the vaccination, except occasionally the formation of a localized abscess is noticed, which is the result of a mixed infection at the place of inoculation. However, they heal readily. The vaccination takes one minute. The record shows that in 20 herds in one day 400 animals were vaccinated, showing the simplicity of the technic of the vaccination. The immunity is only a relative one and the duration of the immunity is not yet established, but it can be positively stated to last one year. This may be proved, since the bacilli in the sac are still alive after ten to twelve months, which was established by test inoculations on guinea-pigs, and therefore the immunity will last at least during the time living tubercle bacilli are present. After this time the bacilli die and the dead bacilli in the sac calcify.

The following results have been obtained by this method of vaccination. If in a herd of 100 tubercular animals 40 prove tuberculous the first year, there is a gradual decrease in the percentage from year to year, which in the course of three years has been reduced to 20, and in some of the herds to 12 per cent. Of course, it is necessary at the same time to carry out the prophylactic and hygienic measures in order to prevent the introduction of the disease into the very young stock before vaccination could have taken

place, and therefore all animals affected with tuberculosis of the udder, and with open tuberculosis, should be destroyed, and the recommendations made by Professor Bang, in connection with prophylaxis should be carefully executed. It is desirable to raise such animals as will resist infection. Not only do I vaccinate non-reacting animals, but also those that react, believing that the vaccination is not only preventive but also curative. There is constantly a small quantity of tuberculin given out from these sacs into the body, which seems to be the ideal method for treatment now so extensively advocated in human practice. That there is a curative action obtained by vaccination is also proved by the fact that frequently animals which were vaccinated will fail to react the second time when tuberculinized. An autopsy is, of course, the most important test in order to see the results of vaccination, and in these tests I have found that a large number of animals which had been vaccinated either showed no lesions or only such as showed a retrogressive form of the disease.

If by this method a relative immunity can be established, a step farther will have been reached toward the eradication of tuberculosis in animals, and perhaps, in the future, also in human beings.

Prof. Bang: I have nothing to say about the vaccination of cattle, because I have done nothing along that line, but I am sure it is very interesting, and I am very glad to have had the opportunity of seeing the farm where Dr. Pearson made his experiments. I heartily congratulate him on the progress he has made, and I hope the next time we come together his method will be sufficient to produce immunity in animals, and also produce an immunity which will last forever. I shall be very glad if it can be done in a practical way.

Dr. Ryder (Chicago): I would like to ask if Professor Heymans uses the bovine type of bacilli in the capsule.

Prof. Heymans: I have used both the bovine and human types, but I feel that the use of bovine cultures is better. However, I have not carried out my experiments sufficiently far to express a definite opinion on that point.

Dr. Morris: I feel that this is one of the most vital subjects that has been presented to this Section. It seems to get at the root of the trouble. If some one can produce an immunity, that ends the disease. It would make any further investigations as to the transmission and as to the use of tuberculin unneccessary. I believe that if greater energy were put forth in this way, greater accomplishment would be obtained.

With reference to our experiments with bovo-vaccinations, I gave the animals the same attention that they would have under the ordinary conditions of farm life. We started with perfectly healthy calves and under sanitary conditions. I vaccinated them according to von Behring's method,

and at the end of two and a half years, when they were slaughtered, 5 out of the 12 calves had tuberculosis, and 7 of the control animals also had tuberculosis. There had been tuberculous cows placed in the herd six months after the infection of the last animals, thus giving them time to gain immunity.

DR. REICHEL (Pennsylvania): When does the animal commence to react after vaccination, and how long will it continue to react?

PROF. HEYMANS: The animal begins to react 4 weeks after vaccination and will cease to show sensitiveness for the tuberculin six to eight months after injection.

DR. CONNAWAY: In his procedure Dr. Pearson recommends the inoculation of the animals while they are young, and says that the immunity will continue for two or two and one half years. He also recommends that you do not inoculate animals during the milking period. This seems to be an important period to have animals immunized. What procedure would you recommend after the animal has come into the milk period?

DR. PEARSON: We do not recommend such vaccination with cultures that are virulent for man. If the culture employed is not virulent for man, the vaccination could be performed during the milk period, but the question is how to tell whether or not the culture is virulent for man.

I would like to ask Professor Bang how von Behring's method is accepted in Europe.

PROFESSOR BANG: I am sorry to say that I do not know much about it. I do not think it has been accepted generally, as the immunity produced does not extend more than one year.

I wish to express my sincere thanks to this Section in behalf of the farmers and dairymen of Denmark, and to congratulate you upon the army of veterinarians in America who are doing great work, and especially the honored President of this Section, whose work is highly appreciated not only by the veterinarians of America, but also by those of foreign countries.

I hope to have the pleasure of meeting many of the members of this Section again at the International Veterinary Congress, to be held next year at The Hague.

DR. PEARSON: I wish to thank Professor Bang for his kind expression in behalf of the people of Denmark. I am sure we have felt honored by his presence at these meetings, and I trust he will convey the greetings of the profession of this country to our honored confrères across the waters.

Index to Volume IV, Section VI.

PAGE

Administrative Control of Tuberculosis, The.—Dr. H. M. Biggs..... 198
Allen, Mr. W. H.—Official Information Necessary to Social Control of Tuberculosis..... 387
*Altersperioden und in welchem Masse hat die Sterblichkeitsrate an Tuberkulose sich während der letzten vierzig Jahre in der Stadt New York bemerkbar gemacht, zu welchen?—Dr. W. H. Guilfoy.. 399
Altschul, Dr. T.....224, 380
Anzeigepflicht bei menschlicher Tuberkulose.—Dr. Hamel..... 203
Argentine Republic, The Campaign against Tuberculosis in.—Dr. Emilio R. Coni..... 49
*Ärztliche Fabriken-Inspektion.—Dr. G. M. Price 31

Bartha, Dr. J.—Die getroffenen und noch erwünschten amtlichen Massregeln gegen die Tuberkulose in der königl. Freistadt Kolozsvar (Ostungarn) 162
Batt, Dr. W. R..... 379
*Beaufsichtigung, die staatliche, von Tuberkulose-Patienten in Pennsylvania.—Dr. S. G. Dixon..... 240
Bekämpfung der Tuberkulose in der deutschen Armee, die.—Dr. Saar.. 462
Bekämpfung der Tuberkulose in den Gemeinden, zur.—Dr. B. V. Farkas..... 274
Beyer, Dr. H. G..... 421
Biggs, Dr. H. M.—The Administrative Control of Tuberculosis.... 198
Geheimrat Pütter's Information Bureaus and Dispensaries..... 226
Bollag, Dr. M.—Die Tuberkulosegesetzgebung in der Schweiz..... 132
Boureille, Dr.—La loi et l'initiative privée contre la tuberculose..... 482
Bracken, Dr. H. M.—The Present Status of Railway Sanitation in the United States..... 333
Bryce, Dr. P. H.....110, 225
Bullock, Dr. E. H..... 111

PAGE

Bushnell, Dr. F. G.—An Aspect of the Evolution of the State in its Relationship to Tuberculosis..... 264
Bushnell, Col. George E..... 409

Caccini, Dr. A.—The Prevention of Consumption among Italian Immigrants..... 454
Calderon, Prof. F.—Tuberculosis in the Philippines..... 465
Calleja, Dr. Camilo.—Conclusiones sobre la Profilaxia de las Tisis.... 169
Canada, The Present State of Antituberculosis Work in.—Dr. J. H. Elliott..... 135
Carrington, Dr. P. M.—The United States Marine Hospital Sanatorium for Tuberculosis at Fort Stanton, New Mexico..... 437
Casas Sanitarias y Hogar Amueblado para los Pobres ó Clase Trabajadora de los Tropicos, en Interés de la Cruzada contra la Tuberculosis, Plan General de.—Jose F. Toraya. 496
Cedercrantz, Gov. C.—The Task of the State in the Antituberculosis Movement..... 36
Chapin, Dr. C. V.—The Need of Family Histories for the Study of Tuberculosis..... 381
Cheney, Dr..... 110
Chyzer, Dr. C.—La lutte contre la tuberculose en Hongrie..... 154
Clapp, Dr. H. C.—The Function of Municipal Governments in Licensing Private Sanatoria for Tuberculosis..... 253
Coni, Dr. Emilio R.—The Campaign against Tuberculosis in the Argentine Republic..... 49
*Construcción y Manejo de los Sanatorios Demostradas por el Instituto de Ohio, Algunas Neuvas Frazes en la.—Dr. C. O. Probst..... 250
Construction and Management of State Sanatoriums as Exemplified by the Ohio Institution, Some of the Newer Phases of.—Dr. C. O. Probst 246

*Abstract.

PAGE

*Construction et l'administration des sanatoria illustrés par une institution de ce genre dans l'Ohio, Quelques unes des plus récentes innovations dans la.—Dr. C. O. Probst 251
*Construction und Leitung von Sanatorien, wie sie sich bei der Institution in Ohio zeigen, einige der neueren Erscheinungen in der.—Dr. C. O. Probst 251
Consumption and Vital Statistics.—Dr. C. A. Hodgetts 371
Control of Tuberculosis with Special Reference to the Maryland System, The Statutory.—Dr. M. L. Price .. 209
*Controlle der Tuberkulose in Maryland, staatliche.—Dr. M. L. Price .. 220
*Coöperación entre el Estado y las Corporaciones Prívadas.—Dr. W. B. Stanton 303
Coöperation between the State and Private Corporations in the Crusade against Tuberculosis, as Exemplified at the White Haven Sanatorium.—Dr. W. B. Stanton .. 290
*Coöpération de l'Etat et des Corporations privées dans la croisade contre la tuberculose dont le sanatorium de White Haven nous fournit un exemple.—Dr. W. B. Stanton 303
Cuba, The Problem of Tuberculosis in.—Dr. J. L. Jacobsen 113
*Cuba, das Problem der Tuberkulose in.—Dr. J. L. Jacobsen 126
*Cuba, El Problema de la Tuberculosis en.—Dr. J. L. Jacobsen 125
*Cuba, Le problème de la tuberculose en.—Dr. J. L. Jacobsen 125

*Dänemark, Massnahmen zur Ausrottung der Tuberkulose in.—Dr. Holger Rördam 25
*Debers del Gobierna General en la Restricción de la Tuberculosis.—Dr. V. C. Vaughan 193
Decline of Phthisis and of other Forms of Tuberculosis in Liverpool, The.—Dr. E. W. Hope 173
*Decrecimiento de la Tisis y de Otras Enfermedades Tuberculosas en Liverpool.—Dr. E. W. Hope 181
Denison, Dr. C.—A Suggested Law to Regulate House Ventilation for the Prevention of Tuberculosis 323
Denmark, Measures against Human Tuberculosis in.—Dr. H. Rördam .. 3
*Dinamarca, Medidas contra la Tuberculosis en.—Dr. Holger Rördam 23
Dixon, Dr. S. G.—The Government Control of Tuberculous Patients in Pennsylvania 232

PAGE

Duties of the Government in the Restriction of Tuberculosis, The.—Dr. V. C. Vaughan 189

Economic Aspects of the Free Treatment of Tuberculosis by the State, Some.—Mr. R. G. Hazard 242
*Einschränkung der Tuberkulose durch Haus-Ventilation.—Dr. C. Denison 331
Elliott, Dr. J. H.—The Present State of Antituberculosis Work in Canada 135
*Estadisticas de Tuberculosis, Colección de.—Dr. C. L. Wilbur 368
*Estado en su Relacion con la Tuberculosis, Evolución del.—Dr. F. G. Bushnell 267
*État dans ses rapports à la tuberculose, L'.—Dr. F. G. Bushnell 268
Evans, Dr. W. A.—Sanitary Measures in Relation to Tuberculosis 313

*Familias, Historia de las, Para el Estudio de la Tuberculosis, Necesidad.—Dr. C. V. Chapin 386
*Familiengeschichten für das Studium der Tuberkulose, die Notwendigkeit von.—Dr. C. V. Chapin 386
*Famille, Besoin d'histoires de, pour l'étude de la tuberculose.—Dr. C. V. Chapin 386
Family Histories for the Study of Tuberculosis, The Need of.—Dr. C. V. Chapin 381
Farkas, Dr. B. von.—Zur Bekämpfung der Tuberkulose in den Gemeinden 274
Federal Health Organization.—Prof. Irving Fisher 271
*Federal, La Organización, de Salud.—Prof. Irving Fisher 273
Fisher, Prof. Irving—Federal Health Organization 271

Government Control of Tuberculous Patients in Pennsylvania, The.—Dr. S. G. Dixon 232
*Gouvernemental, La contrôle, des patients tuberculeux dans la Pensylvanie.—Dr. S. G. Dixon 239
Grèce, La lutte contre la tuberculose en.—Dr. B. Patrikios 28
*Grecia, La Lucha contra la Tuberculosis en.—Dr. B. Patrikios 35
*Greece, The Fight against Tuberculosis in.—Dr. B. Patrikios 35
*Griechenland, der Kampf gegen die Tuberkulose in.—Dr. B. Patrikios 34

PAGE

Guayaquil y Quito, La Tuberculosis pulmonar en las Ciudades de.—Dr. Carlo D. Saenz 62
Guilfoy, Dr. W. H.—At what Age Periods and in what Measure has the Reduction in the Mortality-rate from Tuberculosis Manifested itself in the City of New York during the past Forty Years?..... 391

Hamel, Dr. — Anzeigepflicht bei menschlicher Tuberkulose, die. 203
Discussion..... 225
Harbitz, Dr. Fr..... 223
Harper, Dr. C. A..... 311
Hazard, Mr. R. G.—Some Economic Aspects of the Free Treatment of Tuberculosis by the State..... 242
Heiser, Dr. V. G.—The Tuberculosis Problem in the Philippines and the Elimination of Intestinal Parasites as the First Step in its Solution... 127
Helm, Dr. F.—Die Tätigkeit der Internationalen Vereinigung gegen die Tuberkulose..... 182
Discussion..... 422
Hodgetts, Dr. C. A.—Consumption and Vital Statistics..... 371
Discussion 111
Holton, Dr. H. D..... 240
Hongrie, La lutte contre la tuberculose en.—Dr. C. Chyzer..... 154
(Hongrie orientale), Kolozsvar, Arrêtés municipaux adoptés déjà contre la tuberculose et autres mesures recommandées.—Dr. J. Bartha... 168
Hope, Dr. E. W.—The Decline of Phthisis and of other Forms of Tuberculosis in Liverpool..... 173
*Houses and a Furnished Home for the Poor or Working Class in the Tropics, General Plan of Sanitary. —José F. Toraya..... 497
*Hungaria del Este, Kolozsvar, La Regularizacion Municipal adoptada contra la tuberculosis en la Ciudad Libre, y las medidas Recomendadas. —Dr. J. Bartha..... 167
*Hungary, East Kolozsvar, The Municipal Regulations adopted against Tuberculosis and the Measures Recommended.—Dr. J. Bartha... 166
Hurty, Dr. J. N..... 332

Indians, Fighting the Scourge among, The.—Mr. F. E. Leupp..... 428
*Indios, La Lucha contra la Plaga Entre los.—Mr. F. E. Leupp..... 435
Information Bureaus and Dispensaries, Geheimrat Pütter's.—Dr. H. M. Biggs..... 226

PAGE

*Internacional Contra Tuberculosis, Trabajo hecho por La Asociación. —Dr. F. Helm..... 186
*International Antituberculosis Association, Work of the.—Dr. F. Helm..... 185
*Internationale Antituberculeuse, Travaux accomplis par l'Association.— Dr. F. Helm..... 187
Internationalen Vereinigung gegen die Tuberkulose, die Tätigkeit der. —Dr. F. Helm..... 182
Irwin, Dr. J. W..... 377
Italian Immigrants, The Prevention of Consumption among.—Dr. A. Caccini..... 454
*Italienischen Einwanderern in New York ohne Erfolg ist, warum Verhinderung und Behandlung der Schwindsucht unter den.—Dr. A. Caccini..... 463
Italiens immigrants, Pourquoi les efforts pour prévenir et traiter la Phtisie parmi les, n'ont pas eu de réussite.—Dr. A. Caccini..... 462

Jacobsen, Dr. J. L.—The Problem of Tuberculosis in Cuba..... 113

Kirsch, Dr.—Die Tuberkulose und ihre Bekämpfung in der kaiserlich-deutschen Marine und in den deutschen Schutzgebieten..... 411
Kober, Dr. G. M..... 105
Koch, Dr. Robert..... 222
*Kooperation zwischen Staat- und Privat-Untersuchungen in der Bekämpfung der Tuberkulose, wie veranschaulicht im White Haven Sanatorium.—Dr. W. B. Stanton.. 304
Kürsteiner, Dr. W.—Statistik der Volkssanatorien für Erwachsene in der Schweiz und gegenwärtiger Stand der Tuberkulosebekämpfung in der Schweiz..... 40

Lancastre, Dom Antonio Maria de— The Fight against Tuberculosis in Portugal..... 94
Law to Regulate House Ventilation for the Prevention of Tuberculosis, A Suggested.—Dr. C. Denison.... 323
Leupp, Hon. F. E.—Fighting the Scourge among the Indians..... 428
Levy, Dr. E. C..... 378
Lewis, Dr..... 112
Lewis, Dr. R. H..... 311
Liceaga, Dr. E.—Statistical Data Relative to Tuberculosis in Mexico.. 376
Discussions.....111, 221

PAGE

*Limitacion de la Tuberculosis por Medio de la Ventilación de las Casas, La.—Dr. C. Denison..... 330
*Limitar la Tuberculosis, Sugestiones para.—Dr. E. Toth..... 289
*Limitation de la tuberculose par la ventilation des maisons.—Dr. C. Denison..... 331
*Limitation of Tuberculosis, Suggestions for the.—Dr. E. Toth..... 288
*Limiter la tuberculose, Recommandations pour,—Dr. E. Toth..... 289
Loi et l'initiative privée contre la tuberculose, La—Dr. Boureille..... 482

*Maisons sanitaires ou d'une maison meublée pour la classe pauvre ou ouvrière dans les pays tropicaux, Plan général de.—José F. Toraya.. 496
von Mansfelde, Dr..... 224
Marsh, Mr. Benjamin C.—Town Planning in Relation to the Antituberculosis Campaign..... 319
*Médica, Inspeccion, de la Factoriás.—Dr. G. M. Price..... 310
Medical Factory Inspection.—Dr. G. M. Price..... 307
*Médicale, Inspection, des Usines.—Dr. G. M. Price..... 310
Medina, Dr. J. L.—The Prevention of Tuberculosis..... 490
Discussion..... 112
Menville, Dr..... 112
Mexico, Statistical Data Relative to Tuberculosis in.—Dr. E. Liceaga.. 376
Miles, Mr. Rufus E.—Official Information Necessary to Social Control of Tuberculosis..... 387
Miller, Dr. J. A..... 229
*Municipal, Fonction du gouvernement, pour licencier le sanatorium privé pour la tuberculose.—Dr. H. C. Clapp..... 261
Municipal Governments in Licensing Private Sanatoria for Tuberculosis, The Function of.—Dr. H. C. Clapp..... 253
*Municipales, la Función de los Gobiernos, en la Licensia de Sanatorios para Tuberculosis.—Dr. H. C. Clapp..... 261

National Problem, A Great.—Dr. C. A. L. Reed..... 278
Newsholme, Dr. A..... 222
*Notificacion de los Casos de la Tuberculosis.—Dr. Hamel..... 207
*Notification dans la tuberculose humaine.—Dr. Hamel..... 208

PAGE

*Notification of Human Tuberculosis.—Dr. Hamel..... 206
*Ökonomische Ansichten der freien Behandlung der Tuberkulose durch den Staat, einige.—Mr. R. G. Hazard..... 244
(Ostungarn), die getroffenen und noch erwünschten amtlichen Massregeln gegen die Tuberkulose in der königl. Freistadt Kolozsvar.—Dr. J. Bartha..... 162
Otis, Dr. E. O..... 230

Patrikios, Dr. B.—La lutte contre la tuberculose en Grèce..... 28
*Períodos de la edad y en que extensión se ha Manifestado la Mortalidad por Tuberculosis en la Ciudad de Nueva York, Durante los Ultimos Forty Años, A qué.—Dr. W. H. Guilfoy..... 398
Pflichten der Regierung in der Einschränkung der Tuberkulose, die.—Dr. V. C. Vaughan..... 195
Philippines and the Elimination of Intestinal Parasites as the First Step in its Solution, The Tuberculosis Problem in the.—Dr. V. G. Heiser..... 127
Philippines, Tuberculosis in the.—Prof. F. Calderon..... 465
*Point de vue de l'age, Mortalité due à la tuberculose dans la ville de New York pendant les dernières quarante années au.—Dr. W. H. Guilfoy..... 398
Portugal, The Fight against Tuberculosis in.—Dom Antonio Maria de Lancastre..... 94
*Prevención de la tuberculosis en la Armada Alemana, La.—Dr. Saar.. 408
*Prevención de la Tuberculosis en las Comunidades, La.—Dr. B. von Farkas..... 276
*Prévention de la tuberculose dans les communautés.—Dr. B. v. Farkas..... 277
Prevention of Tuberculosis, The.—Dr. J. L. Medina..... 490
*Prevention of Tuberculosis in Communities.—Dr. B. v. Farkas..... 276
*Prevention of Tuberculosis in German Army.—Dr. Saar..... 407
Price, Dr. G. M.—Medical Factory Inspection..... 307
Price, Dr. M. L.—The Statutory Control of Tuberculosis, with Special Reference to the Maryland System..... 209
Discussion..... 225

PAGE

Probst, Dr. C. O.—Some of the Newer Phases of Construction and Management of State Sanatoriums as Exemplified by the Ohio Institution.. 246
Profilaxia de las Tisis, Conclusiones sobre la.—Dr. Camilo Calleja..... 169
*Prophylaxe der Schwindsucht.—Dr. Camilo Calleja..... 172
*Prophylaxie de la phtisie.—Dr. Camilo Calleja..... 172
*Prophylaxis of Phthisis.—Dr. Camilo Calleja..... 172

Railway Sanitation in the United States, The Present Status of.—Dr. H. M. Bracken..... 33
Reed, Dr. C. A. L.—A Great National Problem..... 278
*Reglementaria contra la tuberculosis en Maryland, Inspeccion.—Dr. M. L. Price..... 220
*Réglementation Statutaire contre la tuberculose en Maryland, La.—Dr. M. L. Price..... 219
Rey, M. Augustin.—Le speculation du sol des villes et la contagion tuberculeuse. Comment peuvent agir les villes..... 423
Rördam, Dr. H.—Measures against Human Tuberculosis in Denmark.. 3
Russian Laws on Tuberculosis.—Dr. S. Th. von Unterberger..... 306

Saar, Dr.—Die Bekämpfung der Tuberkulose in der deutschen Armee. 402
Saenz, Dr. Carlo D.—La Tuberculosis pulmonar en las Ciudades de Guayaquil y Quito..... 62
Salterain, Dr. Joaquin.—The First Six Years' Work of the Uruguayan League against Tuberculosis..... 83
Sanders, Dr. W. H.—What the States, the Counties and Municipalities may do toward the Eradication of Tuberculosis..... 476
*Sanitaires, Mesures, dans les logements.—Dr. W. A. Evans..... 318
*Sanitäre Massregeln in den Wohnungen.—Dr. W. A. Evans..... 318
Sanitary Measures in Relation to Tuberculosis.—Dr. W. A. Evans.. 313
*Sanitarias, Medidas, en el Hogar.—Dr. W. A. Evans..... 317
Sansom, Dr..... 111
Schrötter, Dr. H. v.—Ueber die staatliche und private Fürsorge gegen die Tuberkulose in Oesterreich.... 1
Schweiz, Statistik der Volkssanatorien für Erwachsene in der Schweiz und gegenwärtiger Stand der Tuberkulosebekämpfung in der.—Dr. W. Kürsteiner..... 40
Social Control of Tuberculosis, Official Information Necessary to.—Messrs. W. H. Allen and Rufus E. Miles..... 387
Sol des villes et la contagion tuberculeuse, Le speculation du. Comment peuvent agir les villes.—M. A. Rey..... 423
*Soziale Controlle der Tuberkulose, über die nötigen offiziellen Informationen für die.—Messrs. W. H. Allen und R. E. Miles..... 388
*Staates in seinen Beziehungen zur Tuberkulose, ein Überblick der Massnahmen des.—Dr. F. G. Bushnell..... 269
*Stadtverwaltung bei Genehmigung von Privatheilanstalten für Tuberkulöse, über die Function der.—Dr. H. C. Clapp..... 262
Stanton, Dr. W. B.—Coöperation between the State and Private Corporations in the Crusade against Tuberculosis, as Exemplified at the White Haven Sanatorium..... 290
State in its Relationship to Tuberculosis, An Aspect of the Evolution of the.—Dr. F. G. Bushnell..... 264
State in the Antituberculosis Movement, The Task of the.—Gov. C. Cedercrantz..... 36
States, the Counties and the Municipalities may do for the Eradication of Tuberculosis, What the.—Dr. W. H. Sanders..... 476
Statistics of Tuberculosis, Collection of.—Dr. C. L. Wilbur..... 358
*Statistiken über Tuberkulose, Sammlung von.—Dr. C. L. Wilbur 370
*Statistiques de la tuberculose, Collection de.—Dr. C. L. Wilbur.... 369
Staatliche und private Fürsorge gegen die Tuberkulose in Oesterreich, über die.—Dr. H. v. Schrötter... 1

Thornton, Dr..... 111
Toraya, Dr. José F.—Plan General de Casas Sanitarias y Hogar Amueblado para los Pobres ó Clase Trabajadora de los Tropicos, en Interés de la Cruzada contra la Tuberculosis..... 496
Toth, Dr. E.—Vorschlag zur Ausrottung der Tuberkulose..... 287
Town Planning in Relation to the Antituberculosis Campaign.—Mr. B. C. Marsh..... 319

PAGE

*Tuberculose dans la Marine allemande et les Pays placés sous le protectorat de l'Empire allemand: Mesures préventives.—Dr. Kirsch.. 420
*Tuberculosis and its Prevention in the German Army.—Dr. Kirsch... 419
*Tuberculosis y su Prevencion en la Armada Alemana.—Dr. Kirsch.. 419
Tuberkulose-Gesetzgebung in der Schweiz, die.—Dr. M. Bollag..... 132
Tuberkulose und ihre Bekämpfung in der kaiserlich-deutschen Marine und in den deutschen Schutzgebieten, die.—Dr. Kirsch 411

Ulloa, Dr. Juan 111
*United States Marine Hospital Service Sanatorio para Tuberculosos en Fuerte Stanton, N. Mex. Resultado de Neuve Años de Trabajo.—Dr. P. M. Carrington..... 450
*United States Marine Hospital Service Sanatorium pour tuberculeux à Fort Stanton, New Mexico.—Dr. P. M. Carrington 451
United States Marine Hospital Sanatorium for Tuberculosis at Fort Stanton, New Mexico, The.—Dr. P. M. Carrington 437
*United States Marine Hospital Service Sanatorium für Tuberkulose in Fort Stanton, Neu-Mexiko.—Dr. P. M. Carrington..... 452
Unterberger, Dr. Simon Th. von.—Russian Laws on Tuberculosis.... 306
Uruguayan League against Tuberculosis, The First Six Years' Work of the.—Dr. Joaquin Salterain..... 83

Vaughan, Dr. V. C.—The Duties of the Government in the Restriction of Tuberculosis..... 189
Vorschlag zur Ausrottung der Tuberkulose.—Dr. E. Toth..... 287

Wilbur, Dr. C. L.—Collection of Statistics of Tuberculosis..... 358
Willcox, Mr. Walter F..... 399
Williams, Dr..... 332
Woodward, Dr. W. C..... 225

Index to Volume IV, Section VII.

PAGE

Adami, Prof. J. G. 753
Adenitis, Tuberculous Cervical. A Study of the Tubercle Bacilli Cultivated from Fifteen Consecutive Cases.—Dr. P. A. Lewis 692
Alabama, The Dissemination of Tuberculosis among Animals in.—Dr. C. A. Cary 544
*Animales en cautividad, La tuberculosis en los.—Dr. W. R. Blair... 587
Arloing, Prof. S.—Sur les Rapports de la Tuberculose Bovine et de la Tuberculose Humaine 666
Discussions 521, 742, 744, 772
Atypical Forms of Tubercle Bacilli Isolated Directly from the Human Tissues in Cases of Primary Cervical Adenitis, Studies in.—Dr. C. W. Duval 704

Bailliart, Dr.—Rapport de commission de l'ophtalmo-réaction. Rapports présenté au mon de la société de pathologie comparée 785
Baker, Dr. C. S.—Tuberculosis in Range Cattle in California 561
Bang, Prof. B.—Measures against Animal Tuberculosis in Denmark 850
Discussions 583, 610, 1005, 1006
Beall, Dr. F. O. 950, 951
Beebe, Dr. 609
*Bétail, Apparition et signification des bacilles de la tuberculose dans les féces du.—Dr. E. C. Schroeder.. 607
*Bêtes de baucherie et des vaches laitières, Inspection des pour empecher la propagation de la tuberculose chez le bétail.—Dr. O. G. Noack 995
*Bêtes fauves en captivité, La tuberculose parmi les.—Dr. W. R. Blair 589
Biggs, Dr. H. M. 741
Bitting, Dr. A. W.—The Infection of Swine from Tuberculous Cattle. 757
Discussion 609
Blair, Dr. W. R.—Tuberculosis of Wild Animals in Captivity 584

PAGE

Bovina, La Tuberculosis, en Cuba.—J. T. Cartaya y Dr. J. N. Davalos.. 730
Bovine Tuberculosis, The Control of.—Dr. J. G. Rutherford 869
Bovine Tuberculosis Control, The Problem of.—Dr. M. H. Reynolds.. 927
Bovine Tuberculosis under Range Conditions.—Dr. M. E. Knowles.. 557
Bovine Tuberculosis in Louisiana and some other Southern States.—Dr. W. H. Dalrymple 533
*Bovine, Tuberculose, dans la Louisiane et dans quelques autres états de sud.—Dr. W. H. Dalrymple.... 542

California, Tuberculosis in Range Cattle in.—Dr. G. S. Baker 561
Cartaya, Dr. J. T.—La Tuberculosis Bovina en Cuba 730
Cary, Dr. C. A.—Dissemination of Tuberculosis among Animals in Alabama 544
Cattle against Tuberculosis, The Vaccination of.—Dr. L. Pearson 1002
Cattle from the Point of View of the Farmer, Tuberculosis of.—Prof. J. E. Pope 571
Cattle, The Occurrence and Significance of Tubercle Bacilli in the Feces of Tuberculous.—Dr. E. C. Schroeder 599
Cattle, The Susceptibility of, to the Virus of Surgical Forms of Human Tuberculosis.—Dr. R. R. Dinwiddie 686
Connaway, Dr. 783, 951, 1006

Dalrymple, Dr. W. H.—Bovine Tuberculosis in Louisiana and some other Southern States 533
Davalos, Dr. J. N.—La Tuberculosis Bovina en Cuba 730
Dawson, Dr. C. F.—The Intertransmissibility of Tuberculosis 735
Discussion 521
Deering, Mr. J. M.—Bovine Tuberculosis in Maine for Twenty Years. 909
Denmark, Measures against Animal Tuberculosis in.—Prof. B. Bang.. 850

*Abstract.

PAGE

Dinwiddie, Dr. R. R.—The Susceptibility of Cattle to the Virus of Surgical Forms of Human Tuberculosis. 686
Duval, Dr. C. W.—Studies in Atypical Forms of Tubercle Bacilli Isolated Directly from the Human Tissues in Cases of Primary Cervical Adenitis 704
Dyson, Dr. O. E.—Economics as a Positive Factor in Dissemination of Tuberculosis in Animals..... 512

Eastwood, Dr..... 755
Economic Importance of Tuberculosis of Food Producing Animals, The.—Dr. A. D. Melvin..... 501
Economics as a Positive Factor in Dissemination of Tuberculosis in Animals.—Dr. O. E. Dyson..... 512
*Economique comme facteur positif de la dissémination de la tuberculose chez les animaux, La question.—Dr. O. E. Dyson..... 518
*Etiquettage obligatoire comme moyen de tracer automatiquement les animaux tuberculeux dangéreux et d'obtenir leur éradication d'une manière économique.—Dr. B. Rogers..... 847

Ferguson, Mr..... 848
Fibiger, Prof. J., Investigations of the Relations of Human and Bovine Tuberculosis and the Tubercle Bacillus 672
Discussions 746, 751, 754
*Fleisch und Viehherden als Verhütungsmassregel gegen die Verbreitung der Tuberkulose unter dem Rindvieh, die Inspektion von.—Dr. O. G. Noack..... 995
Flick, Dr. L. F..... 755
Fox, Dr. H.—Observations upon Monkeys of the Philadelphia Zoological Gardens after Injection of Koch's Old Tuberculin..... 591

*Ganado, La Occurrencia y Significacion del Bacilo de la Tuberculosis en el Excremento del.—Dr. E. C. Schroeder..... 606
Gordon, Mr..... 950

Haring, Dr. C. M.—The Prevalence of Tuberculosis among Dairy Cattle in the Vicinity of San Francisco, California..... 564

PAGE

Hess, Dr. A. F.—A Study of the Tuberculous Contamination of New York City Milk Supply..... 523
Heymans, Prof. J. F.—Vaccination gegen Tuberkulose beim Rinde.. 997
Discussions...522, 610, 1003, 1005, 1006
Hogs an Indication of Tuberculous Cattle, Tuberculous.—Dr. A. T. Peters..... 759
Hughes, Dr. D. A.—Precautionary Sanitary Legislation against Tuberculosis of Domesticated Animals in the United States..... 952
Discussion..... 610
Human and Bovine Tuberculosis, Relations of.—Dr. M. P. Ravenel.. 682

Intertransmissibility of Tuberculosis, The.—Dr. C. F. Dawson..... 735
Intra-dermo réaction à la tuberculine chez les animaux, Sur l'.—Prof. G. Moussu et Dr. Ch. Mantoux..... 821
*Intradermo reaction to Tuberculin in Animals, The.—Prof. G. Moussu and Dr. Ch. Mantoux..... 836
*Intradermo-Reaktion auf Tuberculin bei Tieren, die.—Prof. G. Moussu und Dr. Ch. Mantoux..... 835

Jensen, Prof. C. O.—Investigations of the Relations of Human and Bovine Tuberculosis and the Tubercle Bacillus 672
Jobson, Mr. G. B.—The Tuberculin Test an Efficient Agent for the Detection of Bovine Tuberculosis.. 765

*Kalifornien, Tuberkulose unter halbwildem Vieh in.—Dr. G. S. Baker.. 562
*Kennzeichnung als ein Mittel um gefährlich tuberkulöse Futtertiere automatisch einzuschränken und ihre Ausbreitung hinanzuhalten, zwangsweise.—Dr. B. Rogers 847
Kepford, Mr. A. E..... 950
Kingsley, Dr. A. T.—Porcine Tuberculosis..... 612
Kinyoun, Dr..... 951
Klein, Dr. L. A.—Control of Tuberculosis in Domestic Animals in Pennsylvania..... 547
Knowles, Dr. M. E.—Bovine Tuberculosis under Range Conditions... 557
Koch, Prof. Robert.—The Relation of Human and Bovine Tuberculosis 645
Discussion..741, 744, 746, 751, 754, 755, 756

PAGE

*Leche en la Ciudad de New York, Estudio del contagio por la.—Dr. A. T. Hess..... 531
Lewis, Dr. P. A.—Tuberculous Cervical Adenitis. A Study of the Tubercle Bacilli Cultivated from Fifteen Consecutive Cases..... 692
Lignières, Prof. T.—Sur un nouveau mode produire chez l'homme tuberculeux la réaction de la peau à l'aide de la tuberculine..... 814

McCampbell, Prof. E.—Ophthalmo-Tuberculin Test in Cattle..... 804
Magill, Dr..... 531
Maine, Bovine Tuberculosis in, for Twenty Years.—Mr. J. M. Deering. 909
Mantoux, Dr. Ch.—Sur l'intra-dermo-réaction à la tuberculine chez les animaux..... 821
*Marca Obligatoria de los Animales Tuberculosos como un Medio para Indicar los peligros en la Alimentacion y facilitar la eliminacion de estos, La.—Dr. B. Rogers..... 846
Marshall, Dr. C. J.—The Use of Tuberculin in controlling Tuberculosis in Herds..... 903
Massachusetts, History of the Agitation against Bovine Tuberculosis in.—Dr. A. Peters..... 884
*Massachusetts, Geschichte der Agitation gegen die Rindertuberkulose in, daraus erfolgende Rechtsgebung, und Lehren, die man von den Versuchen des Staates in Bezug auf ihre Ausrottung und Kontrolle ziehen kann.—Dr. A. Peters..... 902
*Massachusetts, Histoire de l'agitation contre la tuberculose dans l'état de.—Legislation qui en est resultée et leçons que l'on peut tirer des efforts faits par l'état pour l'extirper et la controler. Dr. A. Peters..... 902
Meat and Dairy Herd Inspection as Preventive Measures against the Spread of Tuberculosis among Cattle.—Dr. O. G. Noack..... 987
Melvin, Dr. A. D.—The Economic Importance of Tuberculosis of Food Producing Animals..... 501
Discussion..... 520
Meyer, Dr..... 784
Milk Supply, A Study of the Tuberculous Contamination of New York City.—Dr. A. F. Hess..... 523
Mohler, Dr. J. R.—Review of Recent Investigations on Tuberculosis Conducted by the United States Bureau of Animal Industry..... 620

PAGE

Monkeys of the Philadelphia Zoological Gardens after Injection of Koch's Old Tuberculin, Observations upon.—Drs. C. Y. White and H. Fox... 591
Moore, Prof. V. A.—The Value of Tuberculin in the Control of Tuberculous Herds..... 918
Discussions.....520, 532
Morris, Dr.....1005
Moussu, Prof. G.—Sur l'intra-dermo-réaction à la tuberculine chez les animaux..... 821

Nelson, Dr. S. B.—A Report of the Results of the Continued Injections of Tuberculin upon Tubercular Cattle..... 773
Discussions.....521, 783, 849
*New Method of Producing in a Tuberculous Human Being the Cutaneous Tuberculin Reaction.—Prof. T. Lignières..... 818
Noack, Dr. O. G.—Meat and Dairy Herds Inspection as Preventive Measures against the Spread of Tuberculosis among Cattle..... 987
Nouveau mode de produire chez l'homme tuberculeux, la reaction de la peau à l'aide de la tuberculine, Sur un.—Prof. T. Lignières..... 814

*Oftalmica, Comision Sobre la Reaccion.—Communicacion presentada en nombre de la Société de Patologie Comparée.—Dr. Bailliart..... 802
*Ophtalmo-réaction chez le betail, L'.—Drs. D. S. White et E. McCampbell..... 811
*Oftalmo-tuberculina en el Ganado, Prueba de la.—Drs. D. S. White y E. McCampbell..... 810
Ophtalmo-réaction, Rapport de commission de.—Rapports présenté au mon de la société de pathologie comparée. Dr. Bailliart..... 785
*Ophthalmo Reaction, Commission on the.—Report Presented in the Name of the Société de Pathologie Comparée.—Dr. Bailliart..... 801
*Ophthalmo-Reaktion, Commission über.—Bericht dargeboten im Namen der Société de Pathologie Comparée.—Dr. Bailliart..... 800
Ophthalmo-tuberculin Test in Cattle.—Drs. D. S. White and E. McCampbell..... 804
*Ophthalmo-Tuberkulin-Probe beim Rindvieh, die.—Drs. D. S. White und E. McCampbell..... 812

PAGE

Park, Dr. W. H.—The Types of Tubercle Bacilli Present in Eighty-four Cases of Human Tuberculosis in New York City..... 697
Pearson, Dr. Leonard.—The Vaccination of Cattle against Tuberculosis.....1002
Discussions.....521, 522, 745, 755, 1006
Peters, Dr. A.—History of the Agitation against Bovine Tuberculosis in Massachusetts..... 884
Peters, Dr. A. T.—Tuberculous Hogs an Indication of Tuberculous Cattle..... 759
Discussions.....611, 848
Piot (Bey), J. B.—Survie économique des bovidés ayant réagi à la tuberculine..... 984
Pope, Mr.....582, 609, 951
Pope, Prof. J. E.—Tuberculosis of Cattle from the Point of View of the Farmer..... 571
Porcine Tuberculosis.—Drs. S. Stewart and A. J. Kingsley 612
Precautionary Sanitary Legislation against Tuberculosis of Domesticated Animals in the United States. —Dr. D. A. Hughes..... 952
Prevalence of Tuberculosis among Dairy Cattle in the Vicinity of San Francisco, California.—Dr. A. R. Ward and Dr. C. M. Haring..... 564
*Prevalencia de la Tuberculosis entre el Ganado de Leche en California, La.—Drs. A. R. Ward y C. M. Haring..... 567
*Préventive, Législation sanitaire, contre la tuberculose des animaux domestiques aux Etats-Unis.—Dr. D. A. Hughes..... 982

Rapports de la Tuberculose Bovine et de la Tuberculose Humaine.—Dr. S. Arloing..... 666
Ravenel, Dr. M. P.—Relations of Human and Bovine Tuberculosis.. 682
Discussion..... 745
Reichel, Dr.....1006
Relations of Human and Bovine Tuberculosis and the Tubercle Bacillus, Investigations of the.—Dr. J. Fibiger and Prof. C. O. Jensen..... 672
Relation of Human and Bovine Tuberculosis, The. — Prof. Robert Koch..... 645
Relation between Human and Animal Tuberculosis, The.—Dr. Theobald Smith..... 651
Relations of Human and Bovine Tuberculosis, The.—Prof. G. Sims Woodhead 661

PAGE

Reynolds, Dr. M. H.—The Problem of Bovine Tuberculosis Control.. 927
Discussions.....581, 582, 848
*Rinderkoth, Vorhandensein und Bedeutung von Tuberkelbacillen im.—Dr. E. C. Schroeder..... 608
Rogers, Dr. B.—Ear-tagging Marketed Live Stock..... 837
Discussions.....521, 849
Rutherford, Dr. J. G.—The Control of Bovine Tuberculosis..... 869
Discussions.....849, 951
Ryder, Dr.....1005

Schroeder, Dr. E. C.—The Occurrence and Significance of Tubercle Bacilli in the Feces of Tuberculous Cattle. 599
Discussion..... 783
Smith, Prof. Theobald.—The Relation between Human and Animal Tuberculosis..... 651
Discussions.....745, 752
*Sparsamkeit als ein Faktor der Verbreitung der Tuberkulose unter Tieren, selbstsüchtige.—Dr. O. E. Dyson..... 519
Stewart, Dr. S.—Porcine Tuberculosis..... 612
Swine, The Infection of, from Tuberculous Cattle.—Dr. A. W. Bitting. 757

Tagging Marketed Live Stock, Ear. —Dr. B. Rogers..... 837
Tendeloo, Prof..... 750
Tuberculin in Controlling Tuberculosis in Herds, The Use of.—Dr. C. J. Marshall..... 903
Tuberculin in the Control of Tuberculous Herds, The Value of.—Prof. V. A. Moore..... 918
Tuberculin Test an Efficient Agent for the Detection of Bovine Tuberculosis, The.—Mr. G. B. Jobson... 765
Tuberculin upon Tubercular Cattle, A Report of the Results of Continued Injections of.—Dr. S. B. Nelson..... 773
*Tuberculina, Las Pruebas de son un Agent Eficiento para Averiguar la Tuberculosis Bovina.—Mr. G. B. Jobson..... 770
*Tuberculine au betail tuberculeux, Raport sur les résultats d'injections continuelles de.—Dr. S. B. Nelson. 782
*Tuberculine dans le contrôle des troupeaux tuberculeux, La valeur de la.—Prof. V. A. Moore..... 924
*Tuberculine, La réaction de la; un agent efficient pour découvrir la tuberculose bovine.—Mr. G. B. Jobson 771

PAGE

Tuberculine, Survie économique des bovidés ayant réagi à la.—J. B. Piot (Bey)..... 984
*Tuberkulins in der Kontrolle tuberkulöser Herden, der Wert des.—Prof. V. A. Moore..... 925
Tuberculosis in Domestic Animals in Pennsylvania, Control of.—Dr. L. A. Klein..... 547
Tuberculosis, Review of Recent Investigations on, conducted by the United States Bureau of Animal Industry.—Drs. J. R. Mohler and H. J. Washburn..... 620
*Tuberkulin auf tuberkulöses Rindvieh, Bericht über die Resultate fortgesetzter Injektionen von.—Dr. S. B. Nelson..... 783
*Tuberkulinprobe ein wirksames Mittel für die Entdeckung der Rindertuberkulose, die.—Mr. G. B. Jobson..... 771
*Tuberkulose unter halbwildem Herdenvieh.—Dr. M. E. Knowles..... 558
Turner, Dr..... 581
Types of Tubercle Bacilli present in Eighty-four Cases of Human Tuberculosis in New York City.—Dr. William H. Park..... 697

Vaccination gegen Tuberkulose beim Rinde.—Prof. J. F. Heymans..... 997

PAGE

*Vorbeugende gesundheitliche Gesetzgebung gegen die Tuberkulose der Haustiere in den Vereinigten Staaten.—Dr. D. A. Hughes..... 981
*Vorherrschen von Tuberkulose unter den Milchkühen in der Umgegend von San Francisco, California, das.—Drs. A. R. Ward und C. M. Haring..... 569

Ward, Dr. A. R.—The Prevalence of Tuberculosis among Dairy Cattle in the Vicinity of San Francisco, California..... 564
Discussion..... 521
Washburn, Dr. H. J.—Review of Recent Investigations on Tuberculosis Conducted by the United States Bureau of Animal Industry..... 620
White, Dr. C. Y.—Observations upon Monkeys of the Philadelphia Zoological Gardens after Injection of Koch's Old Tuberculin..... 591
White, Dr. D. S.—The Ophthalmotuberculin Test in Cattle..... 804
Wild Animals in Captivity, Tuberculosis of.—Dr. W. R. Blair..... 584
Woodhead, Prof. G. S.—The Relations of Human and Bovine Tuberculosis..... 661
Discussions.....743, 747, 755

BINDING LIST SEP 1 1943

RC
307
A4I5
1908
v.4
pt.1-2

International Congress on Tuberculosis. 6th, Washington, D.C., 1908
Transactions of the Sixth International Congress on Tuberculosis

Biological & Medical

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY